Intra-tester reliability of the

Resource Oriented Assessment of Movement (ROAM)

applied in healthy young adolescents

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Vision for the future

'I hope that every child will learn movement separate from Dance and Physical Education. I also hope one day that we see and view an illiterate mover the same way we view an illiterate reader'

Warren Lamb, 2008

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ABSTRACT

Background and purpose: With the knowledge of the Norwegian Global Physiotherapy Examination (GPE) method, an examination method based on psychosomatic physiotherapy with tests related to general aspects of respiration, movements, muscles, skin and a total pattern of tension, and with the experience of applying The Laban Movement Analysis in physiotherapy, the purpose of this study has been to develop an assessment instrument grounded on these methods, and to examine the intra-tester reliability of the instrument.

Method: The instrument, The Resource Oriented Assessment of Movement (ROAM), consisting of an observation protocol, an assessment form, a manual for the analyses and scale for scoring, were constructed. The design of the study was an intra-tester reliability design conducted on analyses of observation of movements of young adolescents. 20 children, 10 girls and 10 boys, with a mean age of 12.5 years, were video-filmed. The observations were analysed by the same tester twice.

Results: The relative intra-tester reliability and absolute intra-tester reliability were overall acceptable. The lowest scores were found in the domain of Effort, some of which were due to a lack of range in the scores of the fairly homogenous group of informants, and some were due to a measurement error by the researcher. The internal consistency of the ROAM was very good, and only a few items within the domain of Body, did not seem to measure what the scale was intended for.

Conclusion: The reliability findings show that the ROAM could be a tool for further investigation of validity and application within physiotherapy. The study has given rise to a further discussion on the choice of the scoring scale and possibly further studies for a reduction in the number of items.

Key words: Laban Movement Analysis – movement resources – movement assessment – intra-tester reliability – paediatric physiotherapy – movement science – Global Physiotherapy Examination

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SAMMENDRAG

Bakgrunn og hensikt: Med kunnskap om Global Fysioterapeutisk Muskelundersøkelse (GFM), en undersøkelse bygget på norsk psykomotorisk behandling til kartlegging av respirasjon, bevegelser, muskulatur og et totalt spenningsmønster, og med erfaring fra bruk av Laban Movement Analysis innen fysioterapi, har hensikten med studien vært å utvikle et instrument til undersøkelse av bevegelser med disse metodene som utgangspunkt. Videre har hensikten vært å undersøke intra-tester reliabilitet av instrumentet.

Metode: Instrumentet, The Resource Oriented Assessment of Movement (ROAM), ble utviklet med en observasjonsprotokoll, et undersøkelses-formular og en manual for analyse med tilhørende skala for registrering av funn. Studien anvendte et intra-tester reliabilitets design, og ble utført ved observasjon av bevegelser hos barn. Materialet bestod av 20 barn, 10 jenter og 10 gutter, med en gjennomsnitts-alder på 12.5 år, som ble video-filmet. Observasjonene ble analysert to ganger av samme person.

Resultat: *Relativ intra-tester reliabilitet* og *absolutt intra-tester reliabilitet* viste adekvate funn. De laveste funn fremkom innen området *Effort*, og enkelte av disse kunne begrunnes i manglende variasjon mellom skårene, på bakgrunn av homogenitet i materialet, men enkelte berodde på en målefeil utført av testeren. ROAMs *interne konsistens* var meget høy. Kun noen enkeltskårer innen området *Body*, viste ikke funn forenlig med testens intensjon.

Konklusjon: Reliabilitetsfunnene viser at ROAM muligens kan være et instrument til videre studier av validitet og anvendelse innen faget fysioterapi. Studien gir grunnlag for videre diskusjon om valg av skårings-skala og videre studier for en eventuell reduksjon i antall variabler.

Nøkkelord: Labans bevegelses-analyse – bevegelses ressurser – test av bevegelser – intra-tester reliabilitet – barnefysioterapi – bevegelsesvitenskap – Global Fysioterapeutisk Muskelundersøkelse

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TERMS AND DEFINITIONS

Action — The observable outcome resulting from the performer's purposeful interaction with the environment (Gentile, 2000).

Activities — In Laban theory there are five basic activities: Locomotion, gesture, stepping, jumping and turning. In addition comes stillness.

Choreutics — the study of harmonic spatial forms and the manner in which they are embodied in movement (Preston-Dunlop, 2008).

Dynamics — In movement science the term is used on temporal and spatial changes and in the use of strength (Carr et al, 2000; Rose, 1997; Shumway-Cook et al, 2001). In Laban theory it is used on Effort which includes Flow.

Effort — consists of the 4 motion factors: Time, Weight, Space and Flow.

Gesture — Non-weight-bearing movements

Jumping — In jumping both feet are elevated from the ground. In dance there are 5 basic jumps: Starting and landing on either one or two feet; *sauté* (hoppe), *levé* (hinke), *jeté* (løpe), *sissonné* and *assamblé*.

Laban Movement Analysis (LMA) UK. In Britain it consists of the 4 domains of Body, Effort, Space and Relationship. In this thesis LMA is referring to the British analysis.

Laban Movement Analysis (LMA) US. In the United States it consists of the 4 domains of Body, Effort, Space and Shapes due to the development by I. Bartenieff (Bartenieff et al, 1980).

Modern Educational Dance. In England, Laban formed sixteen themes from Laban Movement Analysis in a scheme for teaching at different age levels.

Movement Pattern Analysis (MPA) developed by W. Lamb, is used to describe an individual's unique process of decision-making, based on the study of human action and interaction. Through detailed analysis of movement behaviour, MPA establishes a profile of an individual's preferred decision-making style – the distinctive way a person tends to think through or implement decisions (Moore et al, 2009).

Performance — A temporary change in motor behaviour seen during practice sessions. Distinguished from learning, which is defined as a relatively permanent change (Schumway-Cook and Woollacott, 2001).

Skill — The ability to achieve a goal consistently, flexibly and efficiently (Gordon, 2000).

1.0 INTRODUCTION

1.1 Choice of topic

In the 1970's I worked as a physiotherapist at the Psychiatric Department, the Central hospital in Rogaland, Stavanger. I was also a consultant at the Children's Psychiatric Department at the same hospital, to assist in both reporting and the treatment of the children. To meet the challenge of examining the children's motor capacity and possibly also their behaviour, I started applying Rudolf Laban's Movement Theory which I had some knowledge of. With the aid of video I recorded the children during play in the gym, and analysed their movements afterwards. Together with the staff, we gained the experience that this would supply some basic information about the children's movements and their motor patterns, and it would support other observations that would give an understanding of their behaviour. In retrospect, I have also used the Laban Movement Theory for observation of children in primary and secondary schools, to give teachers and parents information about motor stimulation and advice for further actions.

In physiotherapy I have been applying The Global Physiotherapy Examination (GPE) method (Sundsvold et al, 1982) since the early 1970's, and I have followed closely the physiotherapist and researcher Marit Østbye Sundsvold in her work with the development of this method. Here, passive movements and certain active movements are being scaled. My assumption has therefore been, that the same principles of scaling passive and active movements could be applied for analysis of expressive movements.

1.2 Developing a research problem

'A major public health problem' is a term commonly used today on two health issues:

- Within general medicine, in adults with subjective health complaints, like generalised long-lasting musculoskeletal pain, fibromyalgia and chronic fatigue syndrome (Sirnes et al, 2003; Malterud, 1999).
- In children and adolescents with uncertain motor- and behavioural problems, attached to disorders like Developmental Coordination Disorder (DCD) (Gillberg, 1998) and Attention Deficit Hyperactivity Disorder (ADHD) (Tytlandsvik, 1999).

Common to these disorders, both just mentioned, is the difficulty to classify their multidisciplinary problems. There has been great uncertainty and variation with regard to choice of therapeutic approaches both concerning the issues of the children (Tytlandsvik, 1999) and those of adults (Steihaug et al, 2001).

There are several recognised instruments to assess motor and functional skills in both children and adults (Campbell, 2006; Finch et al, 2002). These instruments have been developed mainly to identify motor difficulties and problems, and are less suitable to assess normal movements. Also, researchers have realised the difficulties in examining and reporting children's movements, as these are measured in restricted laboratory settings and never in natural environments. There is a lack of research on a wider competence of normal children's movements (Fjørtoft et al, 2003; Martinsen, 2007), and for examinations that can be performed in more complex activities (Campbell, 2006).

1.3 Aims of the study

Rudolf Laban's Movement Theory has been applied for observation of children's movements in educational settings (Laban, 1992; Sherborne, 1993). I have been interested in finding methods in which the same principles could be applied in physiotherapy, for the observation and analysis of both adults' and children's movements. I have therefore constructed an assessment instrument which I have called the "Resource Oriented Assessment of Movement (ROAM).

The aim of this study is to consider certain aspects of the development of an assessment instrument, which can contribute to envisage movement resources for the use in paediatric and psychosomatic physiotherapy, as well as evaluate standards for normal movements. The focus will be:

- to examine the intra-tester reliability in the ROAM

1.4 My background

At The Royal Orthopædic Hospital School of Physiotherapy, in Birmingham, England, Modern Educational Dance was included in the syllabus, and the students had to dance with teachers from The Birmingham Athletic Institute (BAI). In January 1969 I became a member of the The Birmingham Dance Group and Advanced Modern Dance at the BAI and spent 3-4 evenings every week dancing at the institute, until spring 1973, working as a physiotherapist in Birmingham one year after finishing my studies. Based on this, I was offered a full-time study at The Anstey College of Physical Education, Birmingham, in the school-term 1974/1975. This Physical Education (P.E.) college particularly educated teachers in Modern Educational Dance, and I was given a 'libero' position at the school attending all dance-

classes at all the 3-year levels as well as the 4th year, together with students specialising in dance. This gave me the opportunity to attend a 2-weeks stay at the Laban Art of Movement Studio in 1975, with classes mainly taught by Lisa Ullmann, who had been Laban's 'right hand' and was the greatest authority.

In the autumn of 1975 I became a member of the Psychiatric and Psychosomatic guild under the Norwegian Physiotherapy Association. With another physiotherapist I worked out a module of dance courses which we taught both in Norway and Sweden up to 1984, when 'aerobics' had invaded the arena of movement and 'keep-fit'.

I have always utilised the Laban movement theory, especially within the psychiatric field, and worked out a module for dance therapy. In addition to physiotherapy I have kept courses for teachers and been teaching at the Section for teachers education at the University in Stavanger and at the Section for Performing Arts also at the University of Stavanger. I have been teaching dance to children at all levels from primary school to college.

In 1998 I took part in the Laban International Summer Course for the first time, an institution who has kept the Laban theory curriculae. From 2002 I have attended these courses yearly. Since 2004, when I started planning this dissertation, I needed to search for material from sources in England, both at the Library and Archive at The Trinity Laban Conservatoire of Music and Dance in London and at the National Resource Centre for Dance at Surrey University. The latter centre deposits the archive of Laban's original notes, drawings and published and unpublished material. There are more than 870 titles on the concept of 'Effort' alone. I have attended the Annual General Meetings for The Laban Guild for many years, and taken part in day workshops and lectures. In September 2007 I was offered a place at The

Introductory Course in Movement Pattern Analysis arranged by the British Dance and Movement Therapy Association (DMTuk). In 2008 I attended two greater events in England. Firstly, in July at Dartington, the Laban: Then and Now International conference for the celebration of the work, legacy and influence of Laban in dance, education and therapy. The second was an International conference in London in October, The Dynamic Body in Space where presentations included academic papers, lecture demonstrations, practical workshops and performances.

I attended the first course in the Global Physiotherapeutic Examination with Marit Østbye Sundsvold in 1979, and have followed the development of the GPE since then. I have been in close contact with Sundsvold through seminars and meetings, and also as part of her teaching staff where we met for a yearly 'calibration' and discussion. For many years I used a shorter version of the method in agreement with Sundsvold, but have, through many years, carried out an extensive number of complete GPE examinations.

1.5 ROAM

The ROAM consists of three parts:

I The observation protocol (Appendix 8.1)

II The ROAM assessment form (Appendix 8.2)

III The manual for analyses with the scale for scoring (Appendix 8.3)

I The observation protocol

is designed on the principles used when teaching Modern Educational Dance or LMA. (See Chapter 2.4.) The tasks I have chosen are concerning the most basic themes, which children

without any experience of movement would be able to understand, and with a wide range of areas, so as to give material sufficient enough to support the analysis.

The LMA supplies the framework for the observational tasks which is accurate and disciplined in its form, and requires knowledge of how to develop the tasks, and what to expect concerning their performance. The pedagogy is aimed to encourage creativity and to supply movement opportunities which can reveal each person's skills and capabilities. The tasks are therefore mostly open-ended, and the principles of the teaching are based on the empowerment principles (see Chapter 2.3.2, p. 25).

II The ROAM assessment form

When Laban theory is used in education, the aims are to develop self-awareness, understanding, communication and appreciation (Thornton, 1971). The embodiment of movements will give understanding of the opportunities the body has in its anatomical structure and creative possibilities, give opportunities to realise ones capabilities and how to use them. Movements have different dynamics, and increased experience will enable a person to better understand non-verbal communication. Also with increased awareness of movement forms and dynamics one is likely to become more sensitive to the environment with changing rhythms and impulses, and to find harmony in understanding and appreciation of other people and within the whole society (Thornton, 1971).

Physicians and therapists (David, 2000; Iversen et al, 2005; Tytlandsvik, 1999; Berg, 2003; Steihaug et al, 2001) have reported observations of movement dynamics and qualities beyond the content of the assessment instruments they have applied, for instance that movements are jerky, staccato, very slow or controlled and binded. This could be of interest for further investigation. I have also used my own experience in my physiotherapy work, and have thus

chosen the variables in ROAM from each domain in the LMA (see chapter 2.4) which I have considered to be of significance in physiotherapy.

III The manual for analyses with the scale for scoring (Appendix 8.3)

The manual for the ROAM is based on the theoretical legacy from Laban, a semiotic understanding of the movements, in addition to empiricism of clinical experience as a physiotherapist.

In the teachers' education, attempts were made to give understanding of what the movements would signify and to give a semiotic understanding of the processes and requirements of the movements. *The semiotics is to understand the various processes of signification* (Zelinger, 1979). In our language there are literary codes in addition to the message that is written or spoken. When reading dance, a knowledge of the codes and subcodes associated with everyday movement and non-verbal communication is required (Zelinger, 1979).

Between teachers of LMA (and previously Modern Educational Dance), there has always been a controversy on whether to include technical work, and work towards the acquisition of skills (Preston-Dunlop, 1979). Many teachers would only include creative work as this is the ideology of empowerment, and a common attitude when working in the field of the creative arts. The arguments for the inclusion of closed tasks or technical work is to give the children additional ideas to expand their own movement patterns, and to give them tasks which could improve their movement performance and encourage their potentials.

The analysis is based on grading performance of each variable. The scale for scoring has been selected from the GPE method (See Chapter 3.1.3).

2.0 THEORY

2.1 Movement science

Movement science consists of three focus areas: motor development, motor learning and motor control. During the last century there have been several paradigm shifts in the theories of movement science (Campbell, 2006; Shumway- Cook and Woollacott, 2001; Rose, 1997; Carr et al, 2000).

Motor development

The earliest definition of motor development came from the neural-maturationists in the 1920's who considered development to be an intrinsic property of the organism, and maturation would lead to an unfolding of predetermined patterns. The environment could be a support, but would not alter the development (Thelen et al, 1987). The theories are further described in Chapter 2.2.

Motor learning

According to Rose (1997) motor learning depends on a set of internal processes that leads to a relatively permanent change in an individual's capacity for skilled motor performance, and occurs as a function of practice and experience, not maturation, motivation or training. The learning process itself is not readily observable.

Motor control

Also within the theories of motor control there have been paradigm shifts and competing paradigms (Abernethy, 1992). The latest theories have been named 'dynamic systems' or

'dynamical action systems'. Schumway-Cook and Woollacott define that movement emerges from an interaction between the individual, the task, and the environment in which the task is being carried out (Schumway-Cook et al, 2001). And motor control is the ability to regulate or direct the mechanisms that are essential to the movement.

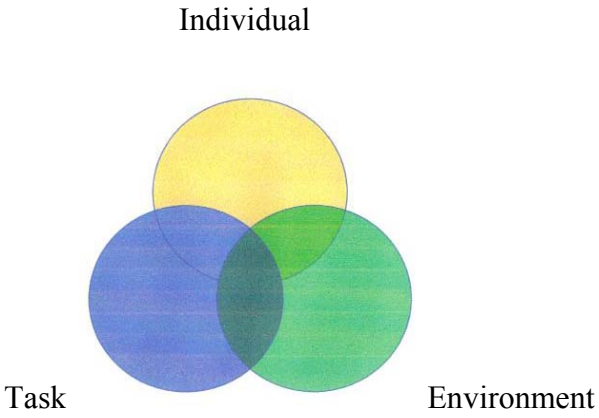


Figure 1. Movement as defined by Schumway-Cook and Woollacott (2001).

Schumway-Cook et al (2001) refer to Gentile (1992) who suggested that movements which are functional and goal-directed could be analyzed at three levels:

1) Action level. Was the person/patient able to perform the functional task, and to achieve the outcome that was intended?
2) Movement level. What movements were used to achieve the intended outcome?
3) Neuromotor level. Motor control is a result of many sub-systems like neurological, biological and muscular systems. None of the subsystems can produce movements alone, and all the sub-systems are equally important. The sub-systems are organized without an external control, which is called self-organization.

Within the context of movement science, Gentile (2000) also distinguishes between several types of behaviours: Investigatory behaviour, and adaptive behaviour such as functional behaviour and communicative behaviour.

In Laban theory 'movement' is defined as a process of changes: *human movement is a fluid, dynamic transiency of simultaneous change in spatial positioning, body activation and energy usage* (Moore et al, 1988).

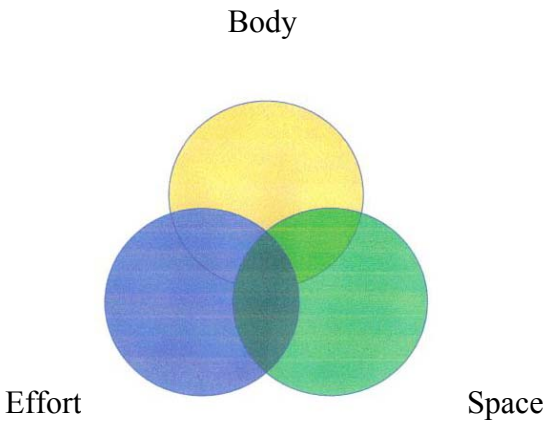


Figure 2. Movement as defined in Laban theory. In addition comes the domain of Relationships.

There are two types of human movements: Inner movements and outer movements (North, 1973). Inner movements are personal non-intentional movements which serve no apparent practical or functional purpose. They can be smaller 'shadow movements' with hands, head or feet, or can be gestures and body movements which are adaptations in situations of fear, stress or joy and reflect an inner state of mind (North, 1973). This would fit into the category which Gentile would categorize as communicative behaviours like gestures and 'body language'.

In Laban theory, outer movements are intentional and serve a purpose like manipulating material and tools, executing functional jobs or performing technical skills, or what Gentile would categorize as actions and functional behaviours (Gentile, 2000). Outer movements

could also include what Gentile (2000) would categorize as investigatory movements such as moving the head to localize a sound, or stroke a surface of an object. Outer movements would also include expressive movements and dance which are intentional but are not (necessarily) manipulating objects. Expressive movements can acquire a high level of technical skills, skill being defined by Gordon (2000) as *the ability to achieve a goal consistently, flexibly, and efficiently.*

2.2 Theoretical development in paediatric physiotherapy

There have been three major approaches within the paediatric theory 1) The neural-maturationist, 2) The cognitive/learning and 3) The dynamical systems theory (Campbell, 2006).

2.2.1 The neural-maturationist theories

Gesell was the pioneer behind this theory, where functional behaviour was thought to appear as the nervous system would mature, with more complex behaviours being based on the activity of progressively higher levels of the nervous system (Campbell, 2006). Predestined stages would gradually appear as the central nervous system (CNS) would mature. Reflexes were central building-blocks in the development and CNS was hierarchiacly built (Campbell, 2006). Maturational theories have a great impact on the development of assessment instruments and models for intervention in paediatric physiotherapy (Iversen, 2006).

2.2.2 Cognitive theories

There are two cognitive theories: The Piagetian theory and the behavioural theory.

Piaget's cognitive schema-theory focuses on the interplay between the maturation of cognitive-neural structures and environmental action possibilities. Assimilation of experiences and accommodation of cognitive structures mature in accordance with experiences. Developmental 'stages' are also central to Piaget, but both Piaget and Gesell emphasised the development as a spiralling process based on the maturation of the nervous system. Clinical contributions have focused on problem solving, cognition and motivation (Iversen, 2006).

Behavioural theory based on Skinner's behaviourism, is a stimulus (reinforcement) – respons theory, or operant responses to environmental stimuli, known from Pavlov. The individual is considered an active participant in interaction with the environment (Campbell, 2006). Clinical contributions have been the focus on individual organization, focusing on practising specific tasks, and on dividing complex activities into simpler and smaller tasks (Iversen, 2006).

2.2.3 Dynamic systems theories

Thelen has been the pioneer behind the dynamic systems theory (Campbell, 2006), which emphasizes the process rather than product, and places neural maturation on an equal level with other processes that interact to promote motor development (Thelen et al, 1987). Focus is on self-organizing subsystems that are continually changing. The central subsystems are the nervous system, the musculoskeletal system, the sensory system, cognitive structures and integrative processes, factors in the environment and aspects of different tasks that are to be solved. Actions are task specific.

The environment is of major importance. Focus is on constraints – that different components in the co-working systems develop in different tempo and that the development is enforced/ impeded by the environment. Focus is on sensitive periods in stages. Development is as a self-organizing spirally formed process, characterized by (relative) stability and instability and new (relative) stable stages.

The ROAM has been developed in accordance with dynamic systems theory.

2.3 Assessment of motor control

There are 2 strategies for assessing motor control: 1. The assessment of difficulties and 2. The assessment of resources.

2.3.1 Assessment of motor difficulties. Existing instruments

In USA the DSM-IV provided in 1994 the use of a new term 'Developmental Coordination Disorder' (DCD) on what earlier was described as 'clumpsy child syndrome' or children with motor difficulties (David, 2000). Iversen et al (2005a) refer to the fact that the classifying criteria in the DSM-IV also can include other diagnoses like ADHD, learning problems, speech- and language-problems, behavioural problems, dyslexia, and psychiatric diagnoses. Iversen et al (2005a) recommended that The International Classification of Functioning, Disability and Health (ICF) is to be used. Geuze et al (2001) wrote a review article based on 176 papers, and found that the classification recommended in the DSM-IV was applied when diagnosing children with motor difficulties.

1. The Movement Assessment Battery for Children (M-ABC).

Several tests have been developed to examine the children's motor control and function (Campbell, 2006). "The Test of Motor Impairment" (TOMI), developed by Stott and co-workers, contained the first test-battery to be applied to examine clumsy children (Tytlandsvik, 1998). The TOMI test examines body transference, balance and manipulation. Henderson and Sugden (2006) have further developed the TOMI test to "The Movement Assessment Battery for Children" (M-ABC). This test has been widely used in clinical physiotherapy in Norway (Berg, 2003) and has been chosen for assessments in many studies of children with DCD (Larsen, 1995; Tytlandsvik, 1999; Iversen, 2006). The M-ABC test examines dexterity, agility and coordination. It has been considered a weakness that M-ABC does not include variables to assess handwriting (David, 2006).

Iversen et al (2005b) investigated the incidence, severity and types of motor problems in young children diagnosed with severe dyslexia. They conclude that all children with reading problems should be screened for possible motor difficulties. In their study the M-ABC test was applied (Iversen et al (2005b). Berg (2003) also applied the M-ABC test in her study in children with dyslexia, adding 9 variables in the area of dexterity, automization of movements, and visual-motor control. Many dyslectics have a very poor and messy handwriting, and hand preference is not dominant. The dominant hand is changed even when writing.

Table I. Existing assessment instruments in paediatric physiotherapy and education

	M-ABC 1 **1992**	**BOT** 2 **1978**	**TMP** 3 **1975**	**MFNE** 4 **2001**	**Fysisk** 5 **Form** **2003**
Age specific	4 age groups	4.5-14.5	8-12	No	No
No of variables	8	14	8	13	9
Walking inner/outer foot				x	
Balance static slow explosive/dynamic	x x x	x		 x	
Strength		x			
Roll ball with foot Skip forward		 x	x x		
Running speed and agility		x			x x
Jumping					x x x
Climbing					x
Bilateral coordination		x x			x
Upper limb coordination Reciprocal coordination	x	x x		x x	
Upper limb speed and dexterity	x	x x		x	
Throw and catch a ball(+handclap) Shotput	x		x	x	x x
Lift leg in prone position Lift arm in prone position				x x	
Lift arms, legs and head in prone position				x	
Passive movements of hips Passive movements				x x	
Imitation of matches patterns				x	
Response speed		x			
Visual-motor control	x	x x x			
Arm/leg preference					
Whistle			x		
Pierce pinholes/ Thread beads	x		x x		
Posting box/Tie shoelace			x x		
Finger opposition				x	
Handwriting					

The xs represent the number of tasks

2. Bruininks-Oseretsky Test (BOT)

This test was published in 1978 by Robert Bruininks and was developed to assess aspects of dexterity and motor performance in physical education. Standardised tasks are measured in seconds or numbers of acceptable performances. There are two tests, of which the shortest consists of 14 tasks (Fjørtoft et al, 2003).

3. Test of Motor Proficiency (TMP)

This test was published buy Gubbay in 1975 and is standardised for children between the age of 8 – 12 years. It consists of 8 tasks for dexterity and motor performance, and scoring is mainly categorical as either absent or present (Fjørtoft et al, 2003).

4. Modified Functional Neurological Examination (MFNE)

In Denmark, Lier and Michelsen developed a motor proficiency test called Funksjons-Nevrologisk Undersøkelse (FNU) (Stray, 2001). In Norway, Stray and co-workers further developed this test called Modified Functional Neurological Examination (MFNE). The test has been developed to recognise children with ADHD, and to be able to separate children who can/cannot benefit from centrally stimulating medication. The method consists of 13 variables, see Table I.

2.3.2 Identification and assessment of resources

Normal mainstream children

In competitive sports, like gymnastics, rhythmic gymnastics, figure skating, sports-dance, horse-riding and ski-jumping, there are long traditions for evaluating motor performance. In Britain the Association for Physical Education has developed two CD-ROMs with instructions and information for observation and analysis of children's movements, one from

the ages 3–7 years and the second from the ages 7–14 (Maude et al, 2006). These are guides for instructors and practitioners and include many motor patterns for tasks like rolling, jumping, handstands, skipping, hurdling, hockey dribble, leaping or tennis serve. These analyses do not include assessments.

In physiotherapy, to compare the basic movement skills and to decide on a standard for normal performance of healthy children, the M-ABC test has been applied internationally. Miyahara et al (1998) compared the skills of 133 Japanese children at the age of 7–11 years with the American standard of the test from 1992. They found significant differences in that the Japanese children obtained higher scores on dynamic balance, while American children scored higher on manual dexterity (Miyahara et al, 1998). There is no equivalent standard-ization for Norwegian children (Berg, 2003), but Iversen et al (2005b) refer to Mæland (1992) who concluded that the American standards of 1992 were appropriate for Norwegian children.

In Norway, the focus of children's movements has greatly been on physical activity and fitness, with emphasis on muscle strength, endurance and mobility (SEF, 2001). One test, 'Fysisk Form' (Physical Fitness)(No 5 in Table I) was developed by Fjørtoft et al (2003) on request from The Norwegian Social- and Health Departement. The test is developed for children at the ages between 4–12 years, and consists of 9 variables for testing gross motor activities like running speed, coordination, balance, muscle strength and endurance (See Table I).

Salutogenesis

Aaron Antonovsky (2000) introduced the term 'salutogenesis' in his book 'Health, Stress and Coping'. With the term he meant the opposite of 'patogenesis' which is the term used on the

search for what is causing diseases (Mæland, 2002). To Antonovsky the salutogenesis meant a change of attitude away from the existing patogenetic attitude in Western medical world of today, concerning the view on health and health promotion. It implies an orienteering towards the health-pole on the continuum good health – bad health, and makes a basis for the search of resources rather than the search for difficulties and deficiencies Antonovsky (2000). Carr and Shepherd (2000) illustrate how a traditional attitude is shown in The Nagi Model where pathology leads to impairment, then to functional limitations and then to disability. Instead they reversed the process by stating that in rehabilitation, therapists should firstly identify the types of roles the individual needed to fulfil desired roles, then identify the skills needed to perform those roles, and then identify the resources needed to accomplish those skills (Carr et al, 2000). In practice, this means that for instance, instead of correcting spasticity in the hemiplegic calf muscles to make the gait look normal, they would look for the best functional use of that spasticity in view of balance, postural control and efficiency.

Empowerment

The pedagogic approach in Laban movement education is mostly theme centered and process oriented with open tasks: *The essence of this contemporary form of teaching is that every single individual has a possibility to develop his own approach and to use his own interpretation* (Laban, 1988). This is also in accordance with the empowerment strategies launched by the World Health Organization (WHO) in the Ottawa charter of 1986. Empowerment is a psychological process where the individual gain control of his/her own life situation and where people are to be capable of solving their own problems and solutions (Mæland, 1993). In the observation setting in the ROAM assessment the physio-therapist/instructor will give a task to be worked with, and discuss possible solutions, and have an open dialogue with the child. The result is that each individual will solve the tasks

according to their own movement repertoire and previous experiences with movement, dance, athletics or sport. In addition they will experience and create new movements on the spot, when ideas from the tasks in the observation protocol is presented. There are no mastering strategies, no competition and no failures. But it must be added that all the work, moving in the space harmonies with the scales and rings (see Figure 3), are technical work with closed tasks.

2.4 Laban Movement Analysis (LMA) – movement resources

There are four domains of movement (See Figure 3):

Body – What moves

Effort – How the body moves

Space – Where the body moves

Relationships – with Whom the body moves.

2.4.1 Body – What moves

Laban stated that we follow natural sequences of movements in a logical way in our various everyday activities, which are determined by the anatomical structure of our body (Laban, 1988). Figure 3 shows the different themes, like the instrumental use of the body with the five basic activities, awareness of the different body parts, how they work in relationship to each other and the torso, and awareness of body shapes which give rise to movements like stretching, twisting, curling up, opening, closing, sinking and rising.

Central movements

To Laban, a ‘flow of movement’ was a major necessity for movements to be efficient and economical (see also Effort). Ideally, the movements should flow through the centre of the

BODY – WHAT MOVES	**EFFORT – HOW THE BODY MOVES**
Instrumental use of the body: Activities like locomotion, turning, jumping, stepping, gesturing, rising, sinking, opening, closing Body parts: Unity of the upper and lower parts of the body Trunk movements initiated in different parts Symmetry and asymmetry of the body Central movements: Unity of the centre of the body and the extremities. Body shapes: Four basic shapes, narrow and wide use of the body, twisted and rounded Manual dexterity	4 Motion factors: Time, Weight, Space and Flow Each of these has two opposite elements. 8 Effort elements: Sustained – Sudden Fine touch – Firm Flexible – Direct Free flow – Bound flow 8 Effort actions – the functional actions: Combinations of the 3 motion factors Time, Weight, Space into Thrust, Slash, Wring, Press, Dab, Flick, Glide and Float Effort attitudes: Combination of 2 motion factors Effort drives: Combination of 3 motion factors Effort actions, Spell drive, Passion drive, Vision drive
SPACE – WHERE THE BODY MOVES	**RELATIONSHIPS -WITH WHOM**
Placement of shapes: Near and far Moving on the floor or ground The dimensional cross/scale The planes: vertical, sagittal, horizontal The diagonal cross/scale Levels: high, middle, deep Choreutics - Space-harmonies: Scales and rings in the geometric figures of the cube, octahedron, icosahedron: A-scales, B-scales, dimensional scale, diagonal scale, 3-rings, six-rings, equator scales	Moving with a partner: Leaders and followers To meet, depart, pass, move over or under Use of focus and eye contact Movements can be copied, repeated, contrasted, be in canons Body contact Transfer body weight onto others, carry, support, care. Moving in groups of 3, 4, 5 or large choirs Moving with props or materials

Figure 3. Laban Movement Analysis, after a model by Marion North (1973).

body uniting it to the head and the extremities. Central movements are considered more mature than the peripheral ones, both concerning a physical performance but also concerning the personality development (North, 1972).

Manual dexterity

The abilities to reach and grasp are essential markers in motor development and motor control. Bradley and Westcott describe in Campbell et al (2006) that children are not capable of grasping with control and precision until the age of 12 years (Bradley et al, 2006).

2.4.2 Effort – How the body moves

In movement science the 'dynamics' of the movements is a common term used on temporal and spatial changes and in the use of strength (Carr et al, 2000; Rose, 1997; Schumway-Cook et al, 2001). In Laban theory the term 'dynamics' is sometimes used on what he called Effort, which included the 4 Motion factors Time, Weight, Space and Flow. But the term Effort is considered to be more accurate than the broader term 'dynamics' since it also includes the Motion factor Flow (Preston-Dunlop, 1979). (Table II). The 4 Motion factors have each two Effort elements which represent opposite poles of a continuum. (The terms 'indulgent in' and

Table II . The 4 Motion factors of Effort and their 8 Effort elements

The Motion factor	**Effort element (indulgent)**	**Effort element (fighting)**
Time	Sustained	Sudden
Weight	Fine touch	Firm
Space	Flexible (multi-focused)	Direct
Flow	Free flow	Bound flow

'fighting against' are commonly used.) The Motion factor of Space includes more accurately the *direction* of the movement (Table II). *Where* the movement takes place in the environment is covered under the 3rd domain Space in the LMA (see p. 27). The Motion factor Flow consists of the 2 elements, Free Flow and Bound Flow, and is not to be confused with 'the flow of movement', fluency or 'the economy of movement'.

In our activities of daily living we rarely use movements with only one effort element. In fact that is quite difficult to perform. At least 2 elements will dominate the movements, but in our functional movements which Laban called 'Effort actions' there are 3 elements. The combinations are 1 element from each of the Motion factors Time, Weight and Space:

Table III. The 8 Effort actions and their 3 components

Effort actions	**Time**	**Weight**	**Space**
Thrust	Sudden	Firm	Direct
Slash	Sudden	Firm	Flexible
Press	Sustained	Firm	Direct
Wring	Sustained	Firm	Flexible
Dab	Sudden	Fine touch	Direct
Flick	Sudden	Fine touch	Flexible
Glide	Sustained	Fine touch	Direct
Float	Sustained	Fine touch	Flexible

Effort attitudes

These are combinations of 2 Motion factors and are also referred to as 'inner attitudes'.

Each person has his/her own pattern of personal repertoire where 2 Motion factors are more dominant than the others. Our Effort attitudes will affect our behaviour. For instance, if a

person is dominant in the Motion factor of Time the person can have the behaviour of always being late and rushing around. It can also mean that the person can indulge in time and never get ready. Or it can mean to have a sense of timing; to be at the right spot at the right time.

Table IV. The Effort Attitudes and their two Motion factor components

Effort attitudes	**Awake**	**Dreamlike**	**Stable**	**Mobile**	**Near**	**Remote**
Time	X			X	X	
Weight		X	X		X	
Space	X		X			X
Flow		X		X		X

The example below can clarify the utilisation of the knowledge of Effort in a physiotherapy setting:

A boy at the age of 8 years assessed in a school setting

The boy was assessed because of behavioural problems both at school and at home. He 'was all over the place' and was always slow in getting ready fiddling with 'other things'. When assessing him he was dominant on the *flexible*, multi-focused, element of the motion factor *Space* and lacked the *direct* element. He was also, at times, dominant on *free flow*. This led him to a remote state of mind which was *time*-consuming. When getting dressed before and after gym-lessons he would walk about talking to the others and physically pick on their clothes, and never getting around to lace up his own shoes. Outdoors he would never walk straight along the pavement but run into gardens or finding objects on the ground. Sometimes his *free flow* could change into *suddenness* and he would appear very awake and alert. He was advanced on manual dexterity compared to his peers. This meant we had reason to believe that other elements could be trained and focused on. Teachers and parents, and the boy himself, were encouraged to develop the *direct* element and also to restrict the *free flow* into *suddenness* and encourage the awareness of *Time*.

Effort drives

Our intentional movements can also be combinations that include the Motion factor Flow. If the Flow factor is replacing one of the other Motion factors Laban called those Effort drives.

The movements are no longer functional and they reflect moods or states of a psychological character. The words used in describing them are considered technical terms for the description of states of mind (Preston, 1972).

Table V. The Effort drives and the Motion factors which each of them consist of

Effort Drives	**Flow**	**Time**	**Weight**	**Space**
Effort Actions		X	X	X
Spell Drive	X		X	X
Vision Drive	X	X		X
Passion Drive	X	X	X	

The Vision drive

In a vision drive the Weight factor is replaced by the Flow factor, and the consciousness of the body's tension is replaced by flux changes. A person in this state is unconcerned for himself and his body and his movements reflect a lack of tactile awareness (Preston, 1972).

The Spell drive

In a spell-like drive the Time element is replaced by Flow. A lack of time consciousness makes it difficult for a person to 'snap out of' the spell-like state of mind. A person who is showing this, literally lacks a sense of timing (Preston, 1972).

The Passion drive

In a passion drive the Space element is replaced by either Free Flow or Bound Flow, so that a passionate thrust is firm and sudden, but the directness is replaced by for instance bound flow. The movement loses its directness and becomes restricted (Preston, 1972).

An example of a 50 year old woman in treatment for fatigue syndrome

The patient had been in psychomotor treatment, relaxation-treatment, for about 6 months. She reported to have a feeling of gaining more energy, but having little strength. This is a common feature in the treatment process when the tensions in the musculature are being released. But suddenly she had started to drop objects, and kitchenware had broken. She felt unstable on her feet and was most worried about a feeling of remoteness. I had observed that her movements tended to be dominated by Flow. Her gestures could be very *free flowing*, but her torso was dominated by a great control and *bound flow*.

This is an example of a state of Vision drive where the Weight-factor had been replaced by Flow. The patient was given explanation of the matter and gained more strength after a few weeks, whereby her troubles disappeared. This knowledge could be of importance in the delimitation towards neurology and psychiatry.

There are many questions about what we would be able to influence in our physiotherapy treatments. The Effort drives can certainly change. The psychologist Torvund (2008) claims that children snap in and out of 'trance' all the time, and Laban educators talk about the experiences when their groups go into different drives. There should be no doubt that we can influence Effort actions and a more versatile vocabulary of the Motion factors through dance and movement training. Little is known about the Effort attitudes, but in daily activities we know that certain people are more dexterous than others. Brunner (2005) referred to studies by Canning et al (2004). They examined patients with hemiplegia and found that loss of strength contributed more to loss of function than to loss of dexterity. They experienced that physical training did not interfere with dexterity.

The significance of 'The Body' and 'Effort' in a health perspective

In psychomotor physiotherapy, breathing and the control of breath is essential in the understanding of the body's defence mechanism and muscular tensions. Laban rarely ever writes about breathing, but he used the term 'The flow of movement' in all his writings. The flow of

movements can come from the centre and flow outward to the extremities or from the extremities inwards to the centre. In education it is an aim to develop central movements as a means for movement maturity and coordination. From a health perspective the flow of movement is important when considering efficacy and energy expenditure. Laban was most concerned with the flow of movement in relation to working movements and labour, and the planning of the total economy of these movements (Laban and Lawrence, 1974). In a pilot study from 1990, blood-pressure, pulse and work capacity were tested in patients with angina pectoris (thoracic pain when exercising) before and after 8 weeks of cardiac rehabilitation and training (Bentzen Lode at al, 1990). No significant changes in blood-pressure or pulse, were found as expected, but their work capacity had improved. This could be related to improved coordination and flow of movement. By assessing the flow of movement, we can gain information about movement patterns, stress and muscular tension.

The back column and its discs are dependent on wringing and twisting movements to stay healthy. The discs are avascular (Grey's Anatomy, 1967) and gain nourishment from mechanical pressure and forces from these movements in particular. Many of the movements in the domains of Body and Effort, like making body-shapes and turning, and using Effort actions with flexibility will provide these forces.

Another example can illustrate how themes from the domains of 'Body' and 'Space' can be of significance in physiotherapy: In a pilot study, performed to assess the observation protocol for the ROAM, the informant was a 12 year old boy diagnosed with ADHD. He showed a well developed movement repertoire and great creativity. But he showed great difficulty with outward turning on the floor, and figure 4 shows the drawing he produced when asked to draw a track with different shapes on a piece of paper. The figures are tight and small due to inward

Figure 4. The drawing of a 'track' using shapes like lines, circles, zig-zags, spirals. Task 8 in the protocol gives content for registrations 13, 85 and 86 in the ROAM.

rotation of the shoulder. According to Stray (2001) the group of ADHD-children who benefit from medication have reduced control of the deeper back muscles. To compensate and stabilise the back movements, the Latissimus Dorsi muscle in the shoulder and the Iliopsoas muscle in the hip are being used. This results in internal rotation of the shoulder and flexion of the hip, which leads to difficulties performing outward turns (Stray, 2001).

2.4.3 Space – Where the body moves

Every body has its personal space. The kinesphere which is the space surrounding each person and which is within reach from any position (Preston-Dunlop, 2008). This personal space has the 3 dimensions, 4 diagonals and 3 levels which will give 27 directional locations. Orientation in space also includes the placements of the body in relationships as near and far, and the relationship of the body to the floor or ground.

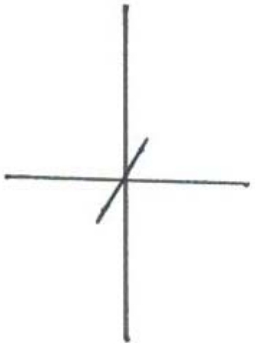
Laban constructed scales and rings in the grid of geometric figures which these directional locations would give origin to: The cube, the octahedron and the icosahedron (figure 5). In addition to these 3 figures he also added the pyramid and the dodecahedron as these were included in Plato's five solids (Plato, 1977). These solids are the only existing ones where all the faces are identical and equilateral, and in which each can be circumscribed by a sphere (Livio, 2003). Laban named his theory of space-harmonies *choreutics*, after the Greek chorosophia, meaning the theory of circles (Ullmann, 1966).

Preston-Dunlop (2008) describes that there is nothing esoteric in the space theory and it can be resembled to the use of scales and pitch in music. And as harmonic laws in music are being used by composers, so can the harmonic laws in space-harmonies be used by dancers and choreographers.

The Dimensional scale which is the most basic scale in the Dimensional cross (See Figure 5 A) will give a stable orientation in the directions up-down, side-side, backwards-forwards. It contains only central movements and gives opportunities for stretching, sinking, crossing and opening but not twisting. It will give movements in all 3 levels of High, Middle and Deep. Laban differentiated between 'a high dancer', 'a middle dancer and a low dancer' and regarded this to be a congenital part of our personality and compared this to the voice with natural pitch of soprano, alto, tenor or bass (Laban, 1950).

The significance of the space-harmonies to health

Working with the space harmonies will give opportunities to develop awareness of an orientation in space. Moving on, and using the floor, can reveal an amount of confidence with which a child moves in space. (In psychiatry the term 'agoraphobia' is an anxiety of being in open space or open places.) Working with the space harmonies will also give opportunities to work with closed tasks, to improve performance and increase coordination and a movement repertoire. The scales and rings (see Figure 5 and 6) are logic and relate to mathematical thinking. They contribute to discipline, alertness and concentration, and when they are learned, they can contribute to a better flow of movement in the body which gives great joy and well-being. They give an endless amount of movement and choreographic ideas, giving rise to creativity.



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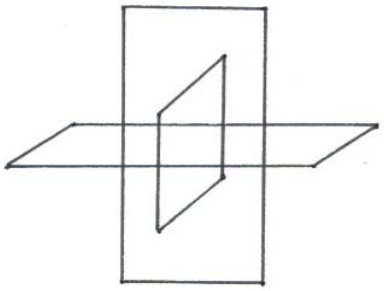

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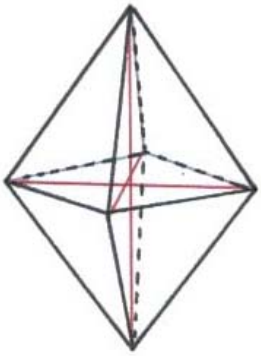

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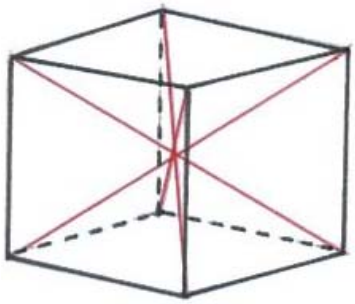

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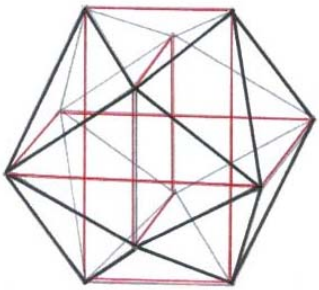

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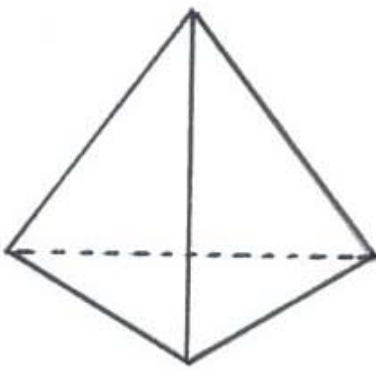

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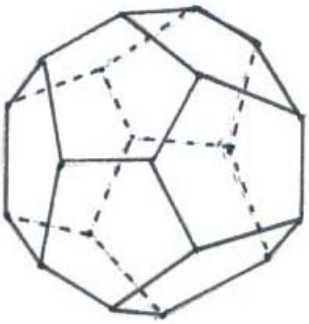
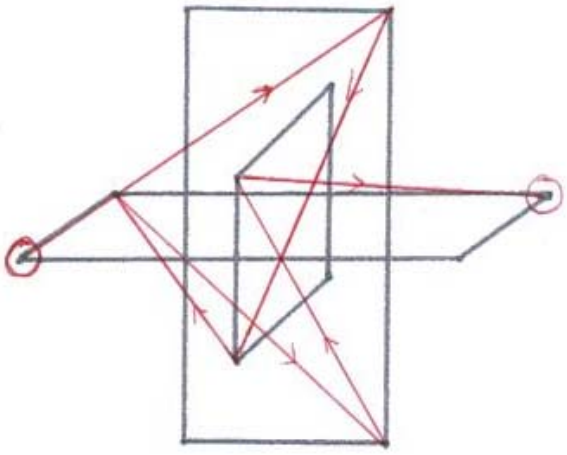
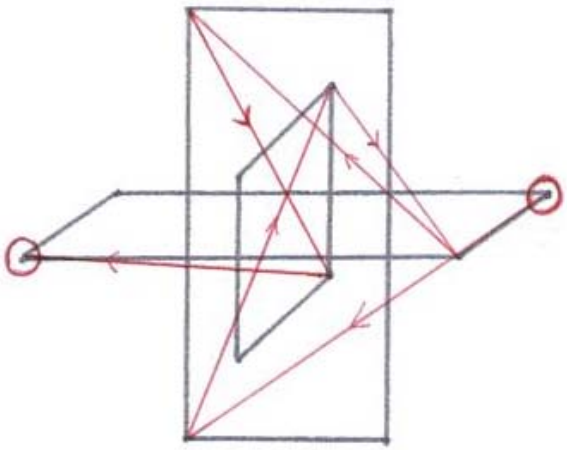


G.

Figure 5.
A. The dimensional cross with 6 directions up/down, side/side, backwards/forwards
B. The 3 planes with 4 directional locations in each
C. The octahedron as a grid over the dimensional cross
D. The cube with the diagonals
E. The icosahedron with the 3 planes inside
F. The tetrahedron
G. The dodecahedron



A.



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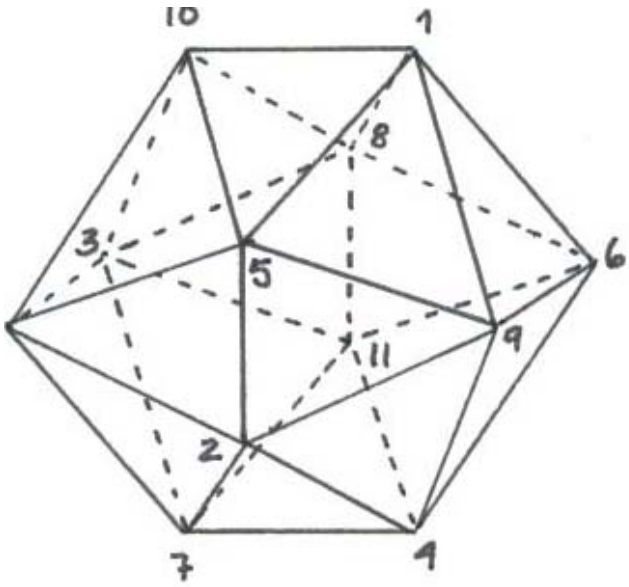

C.

Figure 6.

A. The first half of the Right A scale (performed with Right hand leading)

B. The second half of the Right A scale (performed with Right hand leading)

C. The Icosahedron with the twelve points of the Right A scale.

2.4.4 Relationships – with Whom the body moves

This 4th domain was first of all linked to the choreography of dance where the number of dancers can vary from solo, duo, smaller groups or large movement choirs. Dancers can make use of different formations, distance, focus, eye contact or body contact to give an actual experience to those who take part, which is of major importance in dance therapy. The relationships in a composition can also give a virtual experience to spectators.

In ROAM the themes of Eye contact and Body contact are emphasised. Historically and internationally there are great cultural differences, and the distance or nearness between people are not only biologically determined (Fyrand, 2005). Social status, political and religious rules and laws are reflected in non-verbal communication. But eye and body contact will also reflect a person's ability for emotional nearness, for social capacity and ones self-image. Assessment of eye and body contact can reflect a person's psychological health.

<u>The significance of Relationship in a health perspective</u>

<u>Eye contact</u>

Dr. Nic. Waal used, what she called, eye-blocking as a variable in her assessment "The Nic Waal's Somatic Psychodiagnostic" method (WSP), which was intended for the assessment of autistic or psychotic children (Svendsen, 1975). She differenciated between an active remoteness and a passive remoteness, where the former could have a 'flash of nearness' (Svendsen, 1973). Eye contact is being used as the main factor in "Kroppsrelatert interaksjonsterapi". Body related inter-actional therapy, which is directed towards children with autism, mental retardation, traumatic experiences or where children avoid close contact (Johnsen, 2008).

Body contact

The physiotherapist and Laban-trained dancer Veronica Sherborne used relationships, and in particular body contact, as the central issue in her therapy with mentally retarded children, and children with handicaps like blindness or deafness (Sherborne, 1993). The aim of her therapy was to promote self-confidence, body awareness, physical and psychological sense of security and communication. She developed a movement battery on three different aspects of relationship: Caring relationships, Shared relationships, Against relationships.

2.5 Measurement theory

According to Domholdt (2000) measurement is a way to represent quantities of attributes, and there must be rules for assigning numbers to objects.

2.5.1 What is the objective of the instrument?

Assessment instruments can be designed to be disease-specific or to have generic measurement properties, and the need for measurement instruments is different in the clinical physiotherapy practice and in research. There are different phases in the evaluating-process: observing, describing, operationalizing, classifying and measuring (Ljunggren, 1995). A measurement instrument requires an increased stringency; a set of variables or items must be defined and operationalized and have the ability to record observations by the use of, for instance, scores (Ljunggren, 1995). According to Turner (1990) there are three dimensions in an evaluation of function (see Figure 7):

- The first dimension is the functional level consisting of participation, activities and body structures and body functions. This is in accordance with the International Classification of Functioning, Disabilities and Health (ICF) (WHO, 2001).

- Another dimension is the domain consisting of physical, psychological or social factors.
- The third dimension is the purpose of the measurement differentiating between the ability to discriminate, predict or evaluate effect (Ljunggren, 1995).

Streiner and Norman (2008) make a point of the difficulties with many disease-specific measures, that studies cannot be compared by meta-analysis, which would allow for comparison and contrasting of measures between groups of diseases or for instance, cultural

differences. They recommend that generic measures can be supplemented by disease-specific scales when necessary, and if the total amount of assessments is manageable.

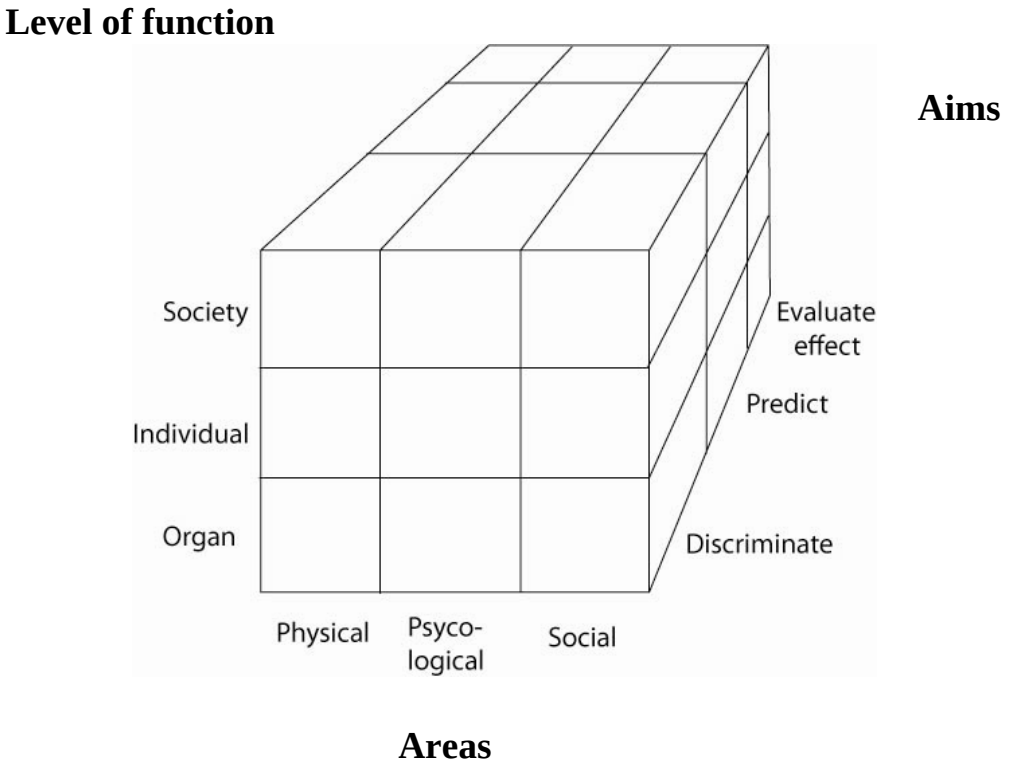

Figure 7. Rehabilitation: Issues in functional assessment. From a model by Turner, 1990 (Ljunggren, 1995.

Possibly, the ROAM could have the aim of discriminating and evaluating the status of physical activities on the functional level, in accordance with the ICF. The exposure of movement resources could be applied to set a standard for movements for different age groups and to assess cultural differences. This could possibly be applied both within preventive medicine and education. The ROAM could possibly also be applied to predict and evaluate outcome of interventions.

2.5.2 Reliability

Reliability, which is the focus in this thesis, is only one of several scientific properties to consider in the development of an instrument. The property of reliability refers to the instrument's ability to measure something in a reproducible manner, free from error of measurement (Streiner and Norman, 2008). There are certain requirements needed to provide reliability (Finch et al, 2002; Streiner and Norman, 2008): A reliable instrument must be able to assess results of clients, there must be a stability of the instrument so that measurements are reproducible, and the instrument must have an internal consistency.

2.5.2.1 Relative and absolute reliability

For an instrument to have any application value, there are two criterias that will have to be met:

- That testers manage to rank the results so that individual variables will keep their position within a group of measurements on repeated measures, which is called relative reliability.
- That the testers manage to rank the observations close to a given standard, or the magnitude of the differences between measures (Domholdt, 2000), which is called the absolute reliability or agreement.

Relative reliability

Relative reliability is measured with some form of correlation coefficient which indicates the degree of association between repeated measurements. According to Streiner and Norman, (2008) Karl Pearson was the first within Classical Theory, to define correlation in that any observation will be composed of two components – a true score and error. Today the Intraclass Correlation (ICC) is commonly used. The calculation of relative reliability is:

$$R = \frac{\text{between – client variance}}{\text{between – client variance + within-client variance}}$$

The relative reliability is relative to the population which is observed, and the situation of the observations. Thus it is of importance that the circumstances and the manner of how the data are collected, are kept as equal as possible. To gain high agreement a wide spread in the range of the scores is required. Low values of the ICC can be due to the limited spread in the ranges of the scores, and are not necessarily a lack of agreement between the registrations. Thus, if the informants are too homogeneous the variance between two ratings can be low or zero. Also, ideally the informants included in a study, should represent the same material as the instrument is intended for.

Absolute agreement

According to Streiner and Norman (2008) absolute agreement indicates the extent to which a score varies on repeated measurement, and the statistics used to measure it is Standard Error of Measurement (SEM) or S_w. It includes both random and systematic components of measurement error, and SEM is the within-subject standard deviation. The calculation of the absolute reliability is:

$$SEM = \sqrt{\text{within-client variance}}$$

The S_W is small when it is close to the mean, and will increase as the score deviates from it, giving less precision of measurement.

2.5.2.2 Internal consistency

The calculation of internal consistency is relevant in instruments consisting of questionnaires or multi-item observations or tests of performance (Finch et al, 2002). It is based on an assessment of the homogeneity of the items in the total scale or in subgroups of a scale. The most frequently used internal coefficient is alpha (α) (Finch et al, 2002).

2.5.2.3 Stability of the instrument

According to Streiner and Norman (2008), the calculation of internal consistency is not sufficient, as it does not take into account that there is likely to be variation from observer to observer. It is required to examine the reproducibility or stability of the measure. The methods for the examination of stability are intra-tester reliability, inter-tester-reliability and test-rest reliability, of which intra-tester reliability is the issue in this study.

Intra-tester reliability

To examine intra-tester reliability, one tester registers scores to a single set of responses on two occasions (Domholdt, 2000). The tester observes the same clients under the same circumstances, and video-filming has been recommended (Finch et al, 2002). This will ensure that the tester is the source of measurement error.

2.5.3 Feasibility

To carry out an observation of ROAM the observer needs to have a basic knowledge of the Laban theory. For physiotherapists in Norway who are unknown with the theory but have a

fair experience of movement, 2 week-courses, with practical training in between, could be an estimate for the basic knowledge.

To analyse the video-tapes, a further knowledge of Laban theory and the ROAM manual would be needed, depending on the physiotherapist's previous experience with movements. Dance therapists or dance teachers in UK would possibly only need an introductory course and could be a resource to rely on.

3.0 METHOD

3.1 Development of the instrument

When constructing ROAM I have had in mind what aspects of movements could be of interests for physiotherapists working with children or adults, which are in accordance with observations that have been reported in articles and dissertations (see chapter 1.5). While psychologists and physiotherapists have developed assessment instruments for different diagnoses the question is 'what else' is there that could be beneficial, and also expected to be present in a normal movement repertoire.

3.1.1. The observation protocol (Appendix 8.1)

The issue of the observation protocol is to provide material for the analysis of movements in all the domains and sub-domains (Appendix 8.2).

When constructing the protocol it has been of importance to take into account that the observer meets the child for the first time. It is quite possible that the child will be unacquainted with these types of movement-tasks and will need information beforehand (Appendix 8.6). The tasks have been selected to give a gradual progression from a position of sitting on the floor, which can give a greater sense of security and confidence, to the last creative task moving in as much space as is available, with a lot of bodily exposure, and with possibilities for creative ideas and movement skills. The last task will also sum up and give the child a chance to include material from the other tasks, like turning, jumping, and use of Effort. The selection of closed tasks can provide for greater confidence, as many children will mainly have movement experience from films and videos. The tasks have also been selected so as to give possibilities to expose a greater variety of movements for the children with a more advanced and matured embodiment.

The protocol has 11 main tasks, and the observation for the ROAM is estimated to last for 30-45 minutes.

3.1.2 The choice of items (Appendix 8.2. The ROAM assessment form)

I have chosen to apply the framework of the GPE-52 (Kvåle, 2003). For the ROAM the 4 main domains in the LMA of Body, Effort, Space and Relationship were chosen, and there are 25 sub-domains:

- 4 in the domain of Body: Variety of the use of the body, Central movements, Activities and Dexterity.
- 16 in the domain of Effort: The 8 single Effort elements and the 8 Effort actions.
- 3 in the domain of Space: Dimensional directions, Floor patterns and Levels.
- 2 in the domain of Relationship: Eye contact and Body contact.

A total of 100 items are distributed with 4 items in each sub-domain. Kvåle et al (2002) found that a reduction in the number of items in each sub-domain from 6 to 4, did not reduce the reliability of the GPE. 4 items seem more manageable than 6.

<u>The choice of sub-domains and variables within the domain of Body (Variables 1 – 16)</u>

The important issue to attend to in this domain would be to assess versatility and a variety in the use of the body and the body parts, and the use of Central movements which is the flow of movement or the fluency in performance. In addition it would be important to find ways of assessing the 5 basic Activities: Locomotion, Stepping, Jumping, Turning and Gesture. The Variety of the use of the body, Central movements and Activities were chosen for sub-domains, and the basic Activities (apart from stepping) were chosen for the variables 1 – 12.

Manual Dexterity is included in many assessments as grasping and manipulating objects are vital milestones in motor development. Both handwriting and hand-dominance are rarely registered and seemed an adequate choice to make, to obtain a holistic assessment of this field (variables 13 – 16).

The choice of sub-domains and variables in the Effort domain (variables 17 – 80)

All the 8 Effort elements and the 8 Effort actions are included in the assessment. The aim is to find which of the Effort elements are dominant and which are less present or missing. Analysing one Effort element on its own is quite difficult as our movements will be complex. On the other hand, to register complete Effort actions require the presence of all 3 Effort elements which compose the Effort action (see Table III, p. 29). If only the Effort actions were selected to the assessment, the scoring could end up as either present or absent which would give very little information of the movement pattern. But when scoring the Effort actions it should be possible to grade the movements. For instance, if a child cannot perform the *flexible* Effort element, the child would not be able to perform complete (consisting of 3 Effort elements) Effort actions of Slashing, Wringing, Flicking or Floating. If the child was dominant on the Effort elements of *firm, sudden* and *direct*, many complete Thrusting actions could possibly be observed and Slashing could be scored at a level of only 1.0, by lacking *flexible* movements. If only the Effort elements were included, it could be very difficult to obtain reliability. If only the Effort actions were included, there could be insufficient findings to conclude on which Effort elements were present or dominant.

All the sub-domains in the domain of Effort have the variables A: for the upper extremities, B: for the lower extremities, C: for the torso and D: for the body as a whole.

The choice of sub-domains and variables within the domain of Space (Variables 81 – 92)

The aim in this domain is to assess a person's orientation in Space. The most basic themes would be to be able to orient oneself in the 3 Dimensions and Levels. These were chosen for sub-domains. The Dimensional cross/scale was chosen on item level, as it is a manageable grid for beginners to familiarise in (variables 81-84 and 89-92). Moving on the floor and making use of the floor is part of an orientation in Space. Thus, tasks to make use of the floor would be an obvious choice for a sub-domain to make a more holistic assessment of the orientation in Space. On item level Shapes and Patterns were chosen (variables 85-88).

The choice of sub-domains and variables in the domain of Relationships (Variables 93 – 100)

Use of focus is part of dancing, but would require instructions and tasks beyond the purpose of this assessment. But Eye contact can prove to be of importance in future application of ROAM, so the items for analyses of Eye contact were constructed as a part of the non-verbal communication in the observation setting (variables 93-96).

Body contact is one of the main issues when LMA is used in therapy. The items are constructed with a progression from the less demanding body contact in variable 97, to the most demanding body contact in variable 100.

3.1.3 The scale for scoring and the manual for analyses (Appendix 8.3)

ROAM utilizes an ordinal scale ranging from an origin of 0 to ± 2 (Sundsvold et al, 1982).

-2 ___-1.7___-1.3___**-1**___-0.7___-0.3____**0**____0.3____0.7____ **1**____1.3____1.7____ **2**

The scoring scale has 2 main groups on either side of the zero. Zero represents the absence of the characteristic. 2 represents the maximal amount of the characteristics which can be obtained. (The negative side of the scale is only to be used on the Effort element *Firm* where the absence of this quality can turn into a passive heaviness.) In the GPE method the zero represents the ideal finding and ± 2.3 represents the maximal aberrations. In the GPE, scale values are added. In the ROAM the zero represents the absence of the finding. If negative numbers are registered the negative finding will be subtracted. Statistically the negative side could be considered unimportant or a disturbance in the data collection, as it is only to be used on registrations of Effort elements with *firmness*.

Each main group is sub-divided into 3 intervals, and the distance between the intervals are unequal, to avoid several decimals like .333 or .667. Point 0.3 clusters towards 0 while the numerals 0.7 and 1.3 clusters around 1, and 1.7 clusters towards 2. This makes the scale clinically lucid to apply, since there are only three main groups, but statistically the validity of this is questionable (Domholdt, 2000). Mathematical manipulations can be impossible or not meaningful (Domholdt, 2000). She also argues that although ordinal-scaled variables do not have equal intervals between the numerals, the distribution of ordinal data is often approximately normal. Parametric tests can be conducted as long as the data themselves meet the parametric assumptions. According to Streiner and Norman (2008) an ideal number in a scoring scale could range from 0–5 or 0–6.

3.1.4 A pilot study and expert opinion

Prior to the study the observation protocol was tried on a 12-year old boy with ADHD. The assessment seemed quite feasible and the tasks quite manageable for a boy with no experience of these movements. Prior to the study an expert opinion from a most experienced Laban-

educator, Sam Thornton, in England, was obtained on the theoretical content and practical procedure of the protocol, the choice of variables and the manual for the analysis.

3.2 Design

The design of an intra-tester reliability study was chosen, to reveal if the same tester could score consistently over time (Domholdt, 2000). The same observations were analysed twice by use of video-filming.

3.3 Material

In previous studies of inter-tester reliability, Sundsvold (1991) and Kvåle (2003) applied 19 or 20 informants. In the final examination for the inter-tester reliability certificate of the GPE, 20 informants were considered adequate, ideally 10 diagnosed patients and 10 healthy controllers. A number of 20 informants would therefore be considered adequate for this study.

As informants healthy young adolescents in the 7th grade at the age of 12 – 13 years were chosen. The arguments for the choice of the age group are that according to Thelen et al (1987) this age group represents an emotional and behavioural stable period in motor development. Laban (1988) also described that by the age of 12 years a child will have acquired a more versatile variation of the Effort vocabulary. The Firm and Sudden movements (the fighting) are the most primitive and will develop first, and the Sustained and Fine touch movement qualities (indulgent) will mature at a later stage. Motorically the child will have developed awareness of weight by the age of 10, and after the age of 11-12 the child will have developed an awareness of volume (Thelen, 1987) which are considered parts of body awareness and are important in the assessment of variables in both the domains Body and Effort. Also, at the age of 13 the children still have the joy of movement and are open for

spontaneity. The older they get, the more they will be forced into greater immobility, and more and more adapt to the adults' ideal of less movement expression (Laban, 1988).

The informants could not have any physical handicaps or mental retardedness. They would have to be able to communicate in the Norwegian language.

Selection of informants

According to Streiner and Norman (2008) the ideal material for intra-tester reliability studies should be extremely heterogeneous. At the beginning it was planned to have 10 informants diagnosed with either dyslexia or with ADHD and 10 healthy controllers. After being in contact with many institutions locally and nationally, with physiotherapists and teachers who were working with projects and studies in the field with these diagnoses, there was no success. It also proved to be difficult to find secondary schools who would take the ex-curricullar burden of contributing with healthy informants. Schools both in the urban area of Stavanger city and the rural areas of Jæren were contacted. Eventually, a decision was made to select only healthy adolescents hopefully to gain representation by both sexes. The Sand School in the rural area of Suldal municipality was contacted, and responded with keen interest.

The inclusion material consisted of 10 girls and 10 boys. 16 children were ethnic Norwegians, 1 was an alien from former Yugoslavia and 3 were aliens from Holland. They were all Caucasian whites. Mean age was 12.5 years = 12 years and 6 months, with variation between 11 years 6 months - 13 years 4 months. Mean age was 12.5 years for both girls and boys.

3.4 Practical procedures

All practical planning and administration was carried out by the researcher in cooperation with the rector at the school. Prior to the project the researcher was invited to attend a parents' meeting to give information about the study. Envelopes with the invitation letters and letters of consent were handed out by the class teachers. The positive responses were returned during the school hours and collected by the same teachers. 12 students responded before the end of the spring term 2007, and 10 students were video-filmed before the summer holiday.

After the summer holiday envelopes were handed out to the new 7th grade class, following the same procedure as last time. This time 8 students responded and were video-filmed together with the 2 'left-overs' from the spring term. Permission to use the gym during school hours was given, and video-filming of the students who were dependent on school buses and ferries was done in their school hours. The others were observed and video-filmed in their spare time, in which the gym was rented.

The video-filming took place in the same gym every time. The filming was conducted by the researcher as it was important to control the use of zooming. It proved to give a calming rhythm in the sessions to perform small adjustments with the camera in between the practical tasks. The students were all very cooperative and pleasant to work with. Some were a bit apprehended to start with, but all gained confidence and seemed relaxed and happy after the first task. They did not seem to be conscious of the camera, and in fact none of them asked to view the takes afterwards.

The observation protocol was followed exactly in the same procedure for all informants, but in one occasion the task number 7 'shadow boxing' was forgotten. After the first 10 observations it was discovered that there was no task included to examine the variable 100 'to

lean against a partner'. This task was added at the end of the protocol for the last 10 informants. This means that the number of informants were 10 in the data collection of variable 100, for the intra-tester reliability calculations.

The timing for each session varied between 34 to 43 minutes with a mean duration of 38 minutes.

3.4.1 Procedure for analyses of the video tapes

Having little experience with the analysis one assessment sheet was picked at random and analysed many times, to decide on a standard for registration. Then each video was analysed, the 20 tapes being picked at random (registration I). The second set of registrations (registration II) was performed in the same order as the first one. Due to practical circumstances there was a break after the 6th assessment in the first set. This meant that there became a time span between registration I and II for the first 6 assessments ranging 53-57 days (mean of 55 days). For the next 14 assessments the time span between registration I and II ranged 28-32 days. The duration spent on each analysis decreased from several hours to 45 – 60 minutes.

3.5 The role as researcher

The researcher (RB) designed and constructed the ROAM and managed all the administration, but did not take part in the selection of informants, which was managed by the teachers. The researcher handled all the observations and video-filming of the children, and kept and analysed the video-tapes. The researcher transferred the data to spreadsheets, designed the dataset and variables, and performed the statistical analyses.

3.6 Statistical analyses

The statistical analyses have been conducted by means of the Statistical Package for the Social Sciences (SPSS), version 15.0 for Windows (Pallant, 2007).

Relative intra-tester reliability

To analyse the relative intra-tester reliability between registrations I and II, the Intraclass Correlation Coefficient (ICC 1,1) was applied, which is equivalent to the SPSS-model "one-way random". According to Kvåle (2003) reliability measures should be interpreted with caution, as the size of the ICC measures are affected by the range of the measurements. The nature of the analysis must also be considered. Streiner and Norman (2008) suggest that reliability measures should exceed a reliability ≥ 0.5. Pallant (2007) suggests high reliability ≥ 0.5, medium reliability ranging between 0.3 - 0.49 and low reliability ≤ 0.29.

Absolute intra-tester reliability

The absolute reliability was calculated as the standard error of measurement (SEM). As mentioned in chapter 2.5.2, the lower the SEM is towards the mean, the more precise is the agreement. According to Streiner and Norman (2008) a reliability of 0.8 is 45% of the standard deviation, and a reliability of 0.5 is 70% of the standard deviation.

The internal consistency of the ROAM

Internal consistency was analysed by Cronbach's alpha. Streiner and Norman (2008) suggests that a reliability $\geq .75$ is a fair requirement for a useful instrument.

To analyse for internal consistency of each item-total correlation the Cronbach's alpha was applied on Registration II (Table 8–31). Streiner and Norman (2008) suggest that a reliability of > 0.3 is a fair requirement.

Also the correlation of Cronbach's alpha have been used to analyse internal consistency between the 4 items in each sub-domain. Each item is correlated to the total sum of the 3 remaining items in the sub-domain, all in Registration II (Appendix 8.4, Tables 8 – 31).

3.7 Ethics

The study was accepted by the Regional Committee for Medical Research Ethics (REK), Western Norway in June 2007 (Appendix 8.7), and was performed according to the Helsinki Declaration. An invitational letter with information about the project, in addition to a form of consent to be signed by both students and their parents, had been written (Appendix 8.6). After the reply from the REK, both the letter of information and the form of consent were rewritten (Appendix 8.8).

4.0 RESULTS

4.1 Reliability

Intra-tester reliability between registration I and II were acceptable concerning overall relative as well as absolute reliability (Tables 6 and 7).

4.1.1 Relative intra-tester reliability (Tables 6 and 7)

The ICC for the main domain of Body was 0.8. All sub-domains in the domain of Body had ICC scores ≥ 0.7 and only the sub-domain Activities (9-12) had a score ≤ 0.75.

The ICC for the main domain of Effort was 0.9. The following 9 sub-domains had ICC scores ≥ 0.72: Time Sudden (21-24), Force Firm (29-32), Direction Flexible (33-36), Flow Bound (45-48), Thrusting (49-52), Slashing (53-56), Dabbing (65-68), Flicking (69-72) and Floating (77-80).

The following 4 sub-domains had ICC scores ≥ 0.6: Force Fine touch (25-28), Direction Direct (37-40), Flow Free (41-44), and Gliding (73-76). Pressing (57-60) had an ICC score of 0.5.

Only Time Sustained (17-20) and Wringing (61-64) had ICC scores ≤ 0.5, (the Wringing was even negative). The lowest score, Wringing, was due to lack of range in the scores with a total mean of 0.88 out of a maximum obtainable score of 8.0. The effort action of Wringing was hardly present in any movements for any of the informants.

The ICC for the main domain of Space was 0.66. The 3 sub-domains had scores ranging from 0.59-0.94 with Dimensional directions (81-84) as the lowest.

In the main domain of Relationships the ICC for the main domain was 0.97 and the scores for the sub-domains were very high, ranging from 0.97-1.0.

The relative intra-tester reliability of the single items are shown in Table 7.

The results show that 58 of the 100 items have ICC ≥ 0.5, 19 items have ICC ranging from 0.3-0.49 and 21 items have low ICC ≤ 0.3. The items with low relative reliability are:

17. TimeSustained A
20. Time Sustained D
25. ForceFirm A
39. Direction Direct C
40. Direction Direct D
41. Flow Free A
59. Pressing C
60. Pressing D
61. Wringing A
62. Wringing B
63. Wringing C
64. Wringing D
67. Dabbing C
73. Gliding A
76. Gliding D
77. Floating A
81. Dimensions UPDown
82. Dimensions SideSide
83. Dimensions BackForward
84. Dimensions Both sides
92. All Levels

Table 6. Intra-tester reliability between measures of the 25 sub-domains and 4 main domains, in registrations I and II in the Resource Oriented Assessment of Movement, measured as pair-wise relative reliability by use of ICC (1,1) and absolute reliability calculated with standard error of measurement (Sw). Also the mean values with minimum to maximum range and standard deviation (SD), in addition to p-values, are presented. (n = 20)

Sub-domain	**Registration I**		**Registration II**		**ICC (1,1) Average measures**	**P-value**	**Sw**
	Mean Range	**SD**	**Mean** Range	**SD**			
Body							
Use of the body Var 1 - 4	**5,65** 2.4 – 8.0	1,49	**5,44** 3.1 – 7.7	1,49	,94	,00	0.4
Central movemnts Var 5 - 8	**4,42** 1.3 – 7.4	1,71	**3,78** 0.6 – 8.0	1,91	,80	,00	0.8
Activities Var 9 - 12	**6,10** 4.7 – 8.0	,77	**5,71** 4.3 – 7.4	,76	,73	,00	0.4
Dexterity Var 13 - 16	**7,60** 6.0 – 8.0	,58	**7,56** 6.1 – 8.0	,61	,98	,00	0.1
Sum Body	**23,82** 1. 15.7 - 30.8	3,62	**22,79** 1. 14..9– 29.4	3,35	,83	,00	1.4
Effort							
Time Sustained Var 17 - 20	**4,68** 1.6 – 8.0	2,04	**6,01** 2.4 – 8.0	1,58	,46	,09	1.2
Time Sudden Var 21 - 24	**7,10** 3.7 – 8.0	1,49	**7,14** 2,0 – 8.0	1,59	,80	,00	0.8
Force Fine touch Var 25 - 28	**5,31** 1.7 – 8.0	2,04	**5,70** 1.7 – 8.0	1,85	,68	,00	1.1
Force Firm Var 29 - 32	**5,85** 0 - 8.0	2,26	**5,36** 2.0 – 8.0	2,13	,77	,00	1.1
Direction Flexible Var 33 - 36	**2,44** 0 – 8.0	2,68	**2,26** 0 – 8.0	2,19	,80	,00	0.9
Direction Direct * Var 37 - 40	**7,89** 7.0 – 8.0	,34	**7,84** 7.4 – 8.0	,41	,59	,50	0.2
Flow Free Var 41 – 44	**3,79** 0 – 8.0	2,90	**2,59** 0 – 8.0	3,09	,66	,01	1.9
Flow Bound Var 45 – 48	**7,10** 0. - 8.0	1,97	**7,52** 0 - 8.0	1,66	,90	,00	0.5

Sub-domain	Registration I		Registration II		ICC 1,1 Average measures	P-value	Sw
	Mean Range	**SD**	**Mean** Range	**SD**			
Thrusting Var 49 – 52	**5,43** 2.0 – 8.0	2,11	**4,55** 1.4 – 8.0	2,08	,78	,00	1.1
Slashing Var 53 – 56	**3,78** 0 – 8.0	2,33	**2,66** 0 - 7.1	2,33	,81	,00	1.0
Pressing Var 57 - 60	**5,36** 0.7 – 8.0	2,86	**4,19** 1.0 – 8.0	1,74	,53	,05	1.2
Wringing Var 61 - 64	**,88** 0 – 3.7	1,23	**,97** 0 – 3.4	,63	,16	,47	0.5
Dabbing Var 65 – 68	**3,82** 0 – 8.0	2,12	**3,64** 0 – 8.0	2,16	,73	,00	1.1
Flicking Var 69 – 72	**1,89** 0 – 8.0	2,60	**1,28** 0 – 6.7	1,84	,79	,00	1.0
Gliding Var 73 – 76	**4,29** 1.7 – 6.8	1,4	**4,55** 1.7 – 8.0	2,02	,63	,01	1.2
Floating Var 77 – 80	**1,36** 0 – 6.8	2,22	**,93** 0 – 6.7	1,90	,84	,00	0.8
Sum Effort	**70,91** 2. 40..3-115.2	20,81	**67,15** 2. 36.7 - 103	18,03	,93	,00	5.7
Space							
Dimensional direct. Var 81 - 84	**5,80** 3.7 – 7.7	1,13	**4,90** 3.0 – 7.7	1,20	,59	,03	0.9
Floor patterns Var 85 - 88	**6,27** 2.0 – 8.0	1,50	**6,64** 3.1 – 8.0	1,27	,72	,00	0.6
Levels Var 89 -92	**7,24** 2.0 – 8.0	,83	**7,30** 4.3 – 8.0	,89	,95	,05	0.2
Sum Space	**19,14** 3. 9.7 – 23.7	3,21	**18,91** 3. 13..3 – 23.0	2,53	,66	,01	1.6
Relationships							
Eye contact * Var 93 – 96	**7,94** 6.8 - 8.0	,26	**7,94** 6.8 - 8.0	,26	1,00	,00	0.0
Body contact Var 97 - 100	**7,77** 6.7 – 8.0 n=10	,49 n=10	**7,77** 7.0 – 8.0 n=10	,41 n=10	,98 n=10	,00	0.1
Sum Relationships	**15,77** 4. 14.7 –16.0 n=10	,49 n=10	**15,77** 4. 15.7-16.0 n=10	,41 n=10	,98 n=10	.00	0.1

Total possible score with 4 variables is 8.

1. Total possible score for Sum Body is 32.
2. Total possible score for Sum Effort is 128.
3. Total possible score for Sum Space is 24.
4. Total possible score for Sum Relationship is 16.

Table 7. Intra-tester reliability between single measures in registrations I and II in the Resource Oriented Assessment of Movement, measured as pair-wise relative reliability by use of ICC (1,1) and absolute reliability calculated with standard error of measurement (Sw). Also the mean values with minimum to maximum range and standard deviation (SD), in addition to p-values, are presented. (n = 20)

	Registration I		**Registration II**		**ICC 1,1 Single measures**	**P-value**	**Sw**
	Mean Max. 2.0	**SD**	**Mean** Max. 2.0	**SD**			
Body							
1. Shapes	1,46	,46	1,37	,39	,71	,00	0.1
2. Bodyparts	1,45	,60	1,36	,56	,68	,00	0.3
3. Gesture	1,53	,46	1,42	,53	,85	,00	0.2
4. Locomotion	1,23	,48	1,28	,45	,80	,00	0.1
5. Cm Dimensions	1,23	,56	1,16	,60	,77	,00	0.3
6. Cm Leader	1,00	,68	,92	,59	,63	,00	0.3
7. Cm Turning	,67	,63	,46	,59	,67	,00	0.3
8. CmJumping	1,51	,52	1,27	,70	,53	,00	0.4
9. Act Jumping *	1,98	,06	1,98	,06	1,00	,00	0.0
10. Act Jump 5	1,92	,18	1,88	,27	,69	,00	0.1
11. Act Turn Open	1,07	,34	,89	,31	,41	,03	0.2
12. Act Turn Close	1,06	,35	,94	,43	,66	,00	0.1
13. Dex Drawing *	1,85	,26	1,83	,24	,66	,00	0.1
14. Dex Picking *	1,98	,06	1,97	,09	,66	,00	0.5
15. Dex Grasping *	1,97	,09	1,97	,09	1,00	,00	0.0
16. Dex Dominan *	1,73	,44	1,73	,44	1,00	,00	0.0

	Registration I		**Registration II**		**ICC 1,1 Single measures**	**P-value**	**Sw**
	Mean Max. 2.0	**SD**	**Mean** Max. 2.0	**SD**			
Effort							
17. Time Sust A	1,35	,58	1,85	,27	-,03	,56	1.2
18. Time Sust B	1,12	,54	1,38	,47	,38	,04	0.3
19. Time Sust C	1,04	,55	1,37	,58	,46	,02	0.4
20. Time Sust D	1,16	,57	1,40	,57	,29	,10	0.5
21. Time Sudd A	2,00	,00	1,86	,29	-,07	,62	0.4
22. Time Sudd B	1,97	,09	1,85	,34	,20	,19	0.2
23. Time Sudd C	1,56	,71	1,69	,54	,60	,00	0.3
24. Time Sudd D	1,56	,71	1,73	,49	,63	,00	0.2
25. Force Fine A	1,56	,43	1,74	,33	,14	,27	0.3
26. Force Fine B	1,34	,57	1,35	,61	,51	,01	0.8
27. Force Fine C	1,20	,63	1,12	,66	,46	,02	0.7
28. Force Fine D	1,20	,61	1,49	,45	,46	,02	1.0
29. Force Firm A	1,72	,42	1,62	,42	,37	,05	0.3
30. Force Firm B	1,65	,54	1,52	,46	,66	,00	0.2
31. Force Firm C	1,29	,74	1,08	,72	,45	,02	0.5
32. Force Firm D	1,18	,83	1,13	,72	,70	,05	0.4
33. Direct Flex A	,68	,75	,71	,61	,37	,00	0.4
34. Direct Flex B	,60	,71	,47	,61	,75	,00	0.3
35. Direct Flex C	,61	,72	,56	,62	,67	,00	0.3
36. Direct Flex D	,53	,65	,51	,63	,61	,00	0.3
37. Dir. Direct A *	1,98	,06	1,98	,06	1,00	,00	0.0
38. Dir. Direct B *	1,98	,06	1,98	,06	1,00	,00	0.0
39. Dir. Direct C *	1,93	,23	1,93	,17	,03	,44	0.1
40. Dir. Direct D *	1,98	,06	1,93	,17	,19	,20	0.1

	Registration I		**Registration II**		**ICC 1,1 Single measures**	**P-value**	**Sw**
	Mean Max. 2.0	**SD**	**Mean** Max. 2.0	**SD**			
41. Flow Free A	1,10	,76	,73	,83	,26	,12	0.7
42. Flow Free B	,85	,78	,65	,82	,39	,04	0.5
43. Flow Free C	,93	,75	,55	,75	,53	,01	0.5
44. Flow Free D	,91	,72	,65	,77	,56	,00	0.5
45. Bound Flow A	1,8	,50	1,90	,38	,78	,00	0.1
46. Bound Flow B	1,75	,50	1,85	,43	,78	,00	0.2
47. Bound Flow C	1,78	,49	1,88	,44	,81	,00	0.1
48. Bound Flow D	1,77	,49	1,88	,44	,80	,00	0.1
49. Thrust A	1,57	,48	1,6	,46	,45	,02	0.3
50. Thrust B	1,62	,39	1,56	,41	,74	,00	0.2
51. Thrust C	1,17	,73	,61	,73	,31	,08	0.5
52. Thrust D	1,07	,75	,76	,76	,56	,00	0.5
53. Slash A	1,39	,66	1,33	,71	,85	,00	0.2
54. Slash B	1,12	,80	,70	,80	,58	,00	0.5
55. Slash C	,61	,72	,38	,55	,65	,00	0.3
56. Slash D	,66	,73	,35	,65	,61	,00	0.3
57. Press A	1,50	,51	1,48	,38	,35	,06	0.3
58. Press B	1,33	,75	1,10	,69	,39	,04	0.5
59. Press C	1,3	,83	,66	,57	,12	,30	0.5
60. Press D	1,23	,87	,94	,54	,29	,10	0.4
61. Wring A	,33	,44	,69	,18	- ,15	,74	0.1
62. Wring B	,15	,26	,03	,15	-,16	,75	0.1
63. Wring C	,22	,36	,10	,26	,12	,30	0.2
64. Wring D	,11	,27	,08	,26	-,120	,70	0.2

Variables	**Registration I**		**Registration II**		**ICC 1,1 Single measures**	**P-value**	**Sw**
	Mean Max. 2.0	**SD**	**Mean** Max. 2.0	**SD**			
65. Dab A	1,41	,64	1,5	,52	,33	,07	0.4
66. Dab B	1,05	,70	1,12	,70	,66	,00	0.4
67. Dab C	,76	,72	,42	,69	,26	,13	0.6
68. Dab D	,70	,71	,50	,69	,38	,04	0.5
69. Flick A	,63	,79	,56	,72	,46	,01	0.5
70. Flick B	,52	,70	,49	,69	,56	,00	0.4
71. Flick C	,37	,71	,13	,43	,62	,00	0.2
72. Flick D	,37	,71	,08	,38	,38	,04	0.3
73. Glide A	1,18	,53	1,67	,37	,18	,22	0.5
74. Glide B	,87	,58	,70	,70	,45	,02	0.5
75. Glide C	1,03	,35	,88	,69	,40	,03	0.4
76. Glide D	1,20	,32	1,35	,42	,23	,16	0.3
77. Float A	,45	,72	,47	,74	,29	,10	0.6
78. Float B	,28	,58	,13	,43	,74	,00	0.2
79. Float C	,26	,53	,16	,46	,77	,00	0.2
80. Float D	,36	,63	,16	,46	,67	,00	0.2
Space							
81. Dim.UpDown	1,75	,27	1,62	,33	,19	,20	0.2
82. Dim. SideSide	1,68	,37	1,50	,29	,16	,24	0.2
83. Dim.BackForw	1,46	,41	1,25	,33	,25	,13	0.3
84. Dim. BothSides	,90	,68	,58	,52	,16	,24	0.4

Variables	**Registration I**		**Registration II**		**ICC 1,1 Single measures**	**P-value**	**Sw**
	Mean Max. 2.0	**SD**	**Mean** Max. 2.0	**SD**			
85. Papersheet	1,56	,43	1,54	,44	,91	,00	0.1
86. Floor pattern	1,63	,39	1,64	,46	,79	,00	0.2
87. Three patterns	1,88	,32	1,88	,35	,96	,00	0.1
88. Whole floor	1,47	,50	1,57	,48	,87	,00	0.2
89. LevelElevation	1,52	,44	1,55	,41	,92	,00	0.1
90. LevelsSinking	1,82	,29	1,86	,26	,62	,00	0.1
91. LevelsMiddle	1,91	,26	1,93	,23	,94	,00	0.0
92. LevelsAll	1,98	,06	1,93	,23	,13	,28	0.1
Relationships							
93. Eye Contact *	1,98	,06	1,98	,06	1,00	,00	0.0
94. Eye Contact *	1,98	,06	1,98	,06	1,00	,00	0.0
95. Eye Contact *	1,98	,06	1,98	,06	1,00	,00	0.0
96. Eye Contact *	1,98	,06	1,98	,06	1,00	,00	0.0
97. Body Cont *	1,98	,06	1,98	,06	1,00	,00	0.0
98. Body Cont *	1,98	,06	1,98	,06	1,00	,00	0.0
99. Body Cont *	1,98	0,6	1,98	,06	1,00	,00	0.0
100. Body Cont n	1,77	,49	1,77	,41	,96	,00	0.1

* The variables are manipulated. Subject 1 has been reduced from the score 2 to 1,7 on all 4 variables.

n. The numbers analysed are 10

4.1.2 Absolute intra-tester reliability (Tables 6 and 7)

Main domains

The main domain of Body yielded a measurement error of 1.4 indicating that there is a 95% confidence interval of ± 2.9, and that the true score of the total sum of Body would be somewhere between 19.87 – 25.71. For the main domain of Effort the measurement error was 5.7 resulting in a confidence of 95% of ± 11.2. This Sw is high, but 11,2 is a measurement error < 10 % of the maximum possible score of 128, which could be considered acceptable. For the main domain of Space the measurement error was 1.6, with a 95% confidence interval of ± 3.1, and the true score of the total sum of Space would range from 15.7 – 22.0. For the main domain of Relationship the measurement error was 0.1 yielding a 95% confidence interval of ± 0.3, and the true score of the total sum of Relationship would range from 15.4 – 16.1.

Sub-domains

In the domain of Body the Sw was ≤ 0.8 for all sub-domains. In the domain of Effort the sub-domain of Flow Free (41-44) had the highest Sw of 1.9. The other sub-domains in the domain of Effort had Sw values ≤ 1.2 which could be considered acceptable. In the domains of Space and Relationships all the sub-domains had Sw values ≤ 0.9 which would be considered acceptable.

4.1.3 Internal consistency (Appendix 8.4, Tables 8 – 31)

The internal consistency of the total ROAM is 0.96. The first column in the tables shows the corrected correlation between each single item and the total scores in ROAM. The second

column shows the correlation between each single item to the sum of the 3 remaining items in the sub-domain, and the last 4 columns show the inter-item correlation in the sub-domain.

Corrected item – total correlation

The items with lack of variance due to a low range in scores are:

9. Activities Jump – all 2.0
14. Dexterity Pick 1.7 – 2.0
15. Dexterity Grasp 1.7 – 2.0
16. Hand Dominance 1.0 – 2.0
37. Direction Direct A all 2.0
38. Direction Direct B all 2.0
39. Direction Direct C 1.3 – 2.0
40. Direction Direct D 1.3 – 2.0
45. Flow Bound A. 1.7 – 2.0
46. Flow Bound B 1.7 – 2.0
47. Flow Bound C 1.7 – 2.0
48. Flow Bound D 1.7 – 2.0
61. Wringing A 0- 1.0
62. Wringing B 0- 0.7
63. Wringing C 0- 1.0
64. Wringing D 0- 1.0
87. Floorpatt3Shapes nearly all 2.0
92-96 Eye contact all 2.0
97 – 100 Body contact 1.7 – 2.0

The following items had values < 0.3:

4. Locomotion
8. CentralMovementJumping
10. Activities 5 Jumps
11. ActivitiesTurnOpen
17. Time Sustained A
18. Time Sustained B
84. DimensionsBoth Sides
85. FloorpattPapersheet

Correlation between each item to the sum of the 3 remaining items in registration II

(Appendix 8.4, Tables 8-31)

The results give indication of items that do not fit well in the sample and will be a basis for further discussion of the relevance and definitions of the items.

4.2 Other results (Table 6 and 7, registration II)

There are no existing assessments to refer to, concerning the level of scoring for the children's actual performance in the ROAM. But even though the material is small with a number of 20, the results can give us an indication of movement patterns and level of performance which are present in this group. In the domain of Body the total mean in registration II is 22 out of a

possible sum of 32 which means 71%. On the level of the sub-domains the Dexterity (variables 13-16) was very high with a mean value ≥ 7 out of the total maximum of 8.0. The sub-domains of Variety in use of the body (variables 1-4) and Activities (variables 13-16) seemed fair, with mean values ≥ 5. The sub-domain of Central movements (variables 5-8) have a mean value ≤ 4 out of a total maximum of 8.0. This is 47% which seemed to be low.

In the domain of Effort the mean values seemed very low, the total mean being 67, which is only 52% of the total maximum score of 128 in the domain. Only Time Sustained (17-20), Time Sudden (21-24), ForceFineTouch (25-28), ForceFirm (29-32), DirectionDirect (37-40), FlowBound (45-48) had mean values ≥ 5.0 of a maximum score of 8.0. Three sub-domains had maximum mean values ≥ 7.0: TimeSudden (21-24), DirectionDirect (37-40) and FlowBound (45-48). The lowest mean values were in DirectionFlexible (33-36) and the Effort Actions of Wringing (61-64), Floating (77-80) and Flicking (69-72). This indicated that there was a general lack of flexible movements in addition to a lack of FineTouch. Regarding the sub-domains with Effort actions (49-80) the results showed no complete Effort actions, 'complete' meaning the presence of all the three Effort elements (see Table III p. 29). The highest mean values were 4.5 out of a maximum score of 8.0, and the lowest mean scores were ≤ 1 with hardly any Wringing or Floating Effort actions.

In the domain of Space the total mean was 19 out of the possible 24. All the sub-domains had mean scores ≥ 4.9 which could indicate that the overall orientation in Space was high.

In the domain of Relationships the total mean score was very high with 15 out of the total 16. Both sub-domains of Eye contact and Body contact showed very high scores ≥ 7 of the total 8.0.

5.0 DISCUSSION

In this study I have examined intra-tester reliability of the ROAM. Both single items and composite scores were considered, as well as the consistency of the scale. I have considered the content of the observation protocol, the scoring scale and the manual for the analysis, and the scores obtained by the children in this material can give some indication of healthy children's movement repertoire and resources.

5.1 Main findings

5.1.1 Reliability

Stability of the level of the domains

Both relative intra-tester reliability and absolute reliability showed acceptable agreement in all four domains. Kvåle (2003) suggests that a S_W of ≤ 2.0 would be acceptable in domains with 4 variables and that higher values would be acceptable in the domains with more variables. This indicate that the main domains of Body, Space and Relationships have acceptable absolute reliability. The S_W of the domain of Effort was high at 5.7 which yield a confidence of 95% of ± 11.17. This could be considered acceptable as it is within 10% of the total maximum score of 128.

Stability on the level of the sub-domains

There were two sub-domains with relative intra-tester reliability ≤ 0.5, namely Time Sustained (17-20) with an ICC of .46 and Wringing (61-64) with an ICC of .16. The latter could be due to a very low range in scores, while in the former sub-domain, reliability was low due to the researcher. This can be corrected by more practice and discussion of the manual for the analysis. The absolute intra-tester reliability of the sub-domains were all

acceptable being ≤ 1.2, apart from Flow Free (41-44) which had a S_W of 1.9. These variables had scores with very low mean values, and apart from one informant who scored maximum, the others hardly showed any Free Flow.

Stability on item level

The results of the intra-tester reliability show that on the item level 58% of the scores have high reliability, 19% have medium reliability and 23% have low reliability. Some of the low reliability results are due to the lack of variance in the homogenous sample of informants.

There was systematically low reliability of the items concerning upper extremities in the domain of Effort, with ICC scores ≤ 0.4 on nearly all these items. This can in the future be corrected by more practice and discussion of the manual for the analysis.

The absolute intra-tester reliability showed acceptable agreement on all items apart from variable 28: FineTouch in the body as a whole (in the Domain Effort).

Internal consistency

ROAM, with this sample of 100 variables, has a high internal consistency of .96. In the domain of Body the variable 4. 'Locomotion' and variable 10. 'The ability to perform 5 jumps', are important variables in assessing abilities on a higher performance level, and it requires more skill and coordination to reach higher scores. These items obtained very low internal consistency correlated with the total scale. According to Streiner and Norman (2008), there is no need to discard single items only on the values of the internal consistency if the total internal reliability of the scale is high (ROAM is high at .96). But further discussion is needed if these items are to be discarded or rearranged in other sub-domains.

In 11 of the 16 sub-domains in the Effort domain, the variables A, movements in the upper extremities, showed a lower internal consistency with the rest of the variables. Anatomically one will expect more movements in the upper extremities than in the lower extremities or in the whole body, particularly with less experienced movers. Thus the lack of relationship need not be an indication that the variables are not measuring the same issue, and the removal of A variables would reduce the collection of important information. But the C and D variables seem to measure the same so as to represent a bias in the material, and the removal of C variables could be considered. A further discussion is needed on the numbers of items in each sub-domain.

Are there certain dimensions in the observations which the observer is not able to detect?

When analysing movements it is known that observers have difficulties in detecting movements which are not integrated in the observer's own movement repertoire. This can represent a bias in the analyses as the observer will skew the results towards hers/his own movements (North, 1973). This will always represent an error of measurement. One answer to this problem is to perform inter-tester reliability examinations. Another solution is to have a Movement Pattern Analysis profile tested, which will give an indication of the personal movement pattern, in view of versatility or bias.

5.2 The instrument

The observation protocol

The main issue of the protocol is to provide movement material sufficient for the analysis. There seemed to be tasks for possibilities of all movements in the assessment. To provide 'indulgent' movements like slow, Sustained and Fine touch, a chiffon scarf was used as

stimulus. This should be sufficient to provide these movements. But further discussion is needed on whether to include more tasks for 'Wringing' movements (variables 61-64), as these were generally absent with all the informants. There is a need to investigate if the observation protocol provide opportunities for these movements, or if this absence is a reflection of a poorer movement behaviour of young adolescents in their daily living.

The choice of items

As recommended by Streiner and Norman (2008) it is preferable to include many items initially in order to be able to discard items as reliability and validity tests require to do so. It is of importance to study items that add little information or correlate strongly with other test items, to make an instrument less time-consuming and to develop a sounder test-battery (Kvåle, 2003).

A discussion is needed on the issue of the total number of items in the scale. From the aspect of internal consistency there seems to be an obvious benefit to reduce each sub-domain, eg to only 3 variables in each, to reduce the total number of items from 100 to 75. This will imply a discussion on the reliability of the sub-domains and the risk of increasing measurement error.

In the domain of Body a discussion is needed if items should be rearranged or would correlate better in other sub-domains, for instance in Turning or Jumping.

In the domain of Effort, all the variables C (movement in the torso) were nearly impossible to assess. The movements in the torso are difficult to separate, and there were hardly any differences between the Cs and the Ds (movement in the whole body). These items seem to correlate strongly and there is a question if it would be beneficial to discard the C variables.

The scale for scoring

The scoring scale seemed functional to use. Only on one occasion was the negative side of the scale in use, so there is the question to discuss whether the scoring scale should keep the negative side of the scale or only the positive side. Also it will be necessary to discuss if the scale should only consist of categories ranging from 0-6 without decimal numbers, as recommended by Streiner and Norman (2008) (Chapter 3.1.3).

The manual for the analysis

Generally the experience was that the manual seemed to function quite satisfactorily. But the item 8.'Central movements when jumping' needs to be corrected. When jumping, it is the elevation which is being assessed. Discussion is needed on either removing it from the sub-domain of Central movements, or to rearrange the item in another sub-domain.

For the domain of Effort the manual needs further discussion for a possible 'gold standard'. What does the term 'medium' imply with the complexity of three Effort elements in the Effort actions? To decide on a future 'gold standard' all the video-observations have been analysed by my English mentor, Sam Thornton, for further discussions and consensus.

5.3 Methodological considerations

The lack of experience with the ROAM beforehand was the main hazard concerning the intra-tester reliability. Only a pilot-study with one informant had been performed, which had mainly focused on the application of the observation protocol. The standard for the interpretation of the manual was tested by analysing one informant many times before the

actual registration took place. As intra-tester reliability increases with practice, more extensive practice of analysis is advised before future studies.

The observation situation is quite physically and pedagogically demanding on the observer as an active partner with the informant, which has to be taken into consideration and planning. The attitude of empowerment is vital for the dialog with the informant. But the work is very rewarding as no session is the same, and so much movement can appear unexpectedly. Usually this brings out a lot of joy from the informants, particularly with children who are less academically strong, and are not always successful in schoolwork.

5.4 Other considerations

From the early 1990's there have been several curricular reforms in the Norwegian education where the amount of physical education has been reduced to as low as one lesson per week for children and young adults. Today the numbers of lessons are gradually increasing as obesity has become a national concern of public health in general. But the focus of content in physical education has been the issue of burning calories and endurance training rather than exercises for strength and agility.

Today the increasing sickness and sick-leaves due to lifestyle and a stressful living have become the concern of many. To relieve stress, tension and strain injuries like low back pain, we are deprived of bending by long handles on tools, we are deprived of twisting by rotating chairs and we have equipment in our homes to deprive us from using strength and manual work. Stress-less chairs deprive us from discomfort, and relaxation and passivity have become the ideal way of recuperating. But to keep the body healthy we need movements for the full

range in the hips and shoulders, and we need twisting, bending and stretching of the back column and its discs.

The children in this material are all mainstream in a school with a high standard pedagogically and materially. But their movement repertoires and potentials are not well developed. In the Effort domain, with the variables of the Effort elements and actions, the children scored only 50% of the maximum obtainable 128. Lack of Effort means that the movements lack dynamics and qualities, like watching films in black and white. Also the Effort is a reflection of our personality and emotions. There was a dominance in the fighting side of the continuum, Firm, Sudden, Direct and with Bound Flow, which are considered to be the more primitive and immature movements. There was a maximal score in Bound Flow for all the informants, with hardly any Free Flow, which together with low scores on Central movements could indicate a high degree of control in the movements accompanied by restricted breathing. Kvåle et al (2002) found significant differences between respiration in the healthy control group compared to the patients with generic musculoskeletal pains or with neck/back pain. In my private practice as a psychomotor physiotherapist I now get an increasing number of adolescent patients down to the age of 12 years, with stiffness and lack of mobility in their backs, necks, shoulders and hips. Further research could be of interest in this field.

In Norway we have little cultural tradition for dancing (apart from folk-dancing) and there is little emphasis on quality of movements in the educational curriculum. Children in Norway must be organized in sports-clubs or culture schools in their spare time, to get an opportunity to develop their movement potential. According to SEF (2000) body awareness and joy of movement is basic in the physical, psychological and social development, which also increases self-confidence and improves the body-image. Also important is the fact that

children gain a higher social status by increasing their motor capacity and level of motor activity. It would be an extra bonus if ROAM could in any way contribute to more interest in the field of preventive physiotherapy and health education.

For future studies it could be of interest to apply the ROAM on a larger number of children to examine differences in gender, nationalities and cultures as well as between children from rural or urban areas, and to examine the validity of the ROAM in itself.

6.0 CONCLUSION

There is a need for teaching the method and content of observation to other physiotherapists if the instrument is of interest. In addition to be able to apply the ROAM, there is a lot of knowledge in the theory which could be useful in clinical physiotherapy in many fields. For the ability to analyse the movements, physiotherapists must have an interest and endurance to go through a process of learning. This could be resembled with the learning process of the GPE-method, but the ROAM requires also an active physical training, which probably would be desirable for many physiotherapists.

This study shows that ROAM meets the requirements which will have to be met for an assessment instrument, concerning reliability. Further discussion is needed on the content of the instrument, the observation protocol, the scoring scale and the manual for analysis. It is quite possible that a changing of the scoring scale and a reduction in items would be beneficial. For further research several aspects of validity and application within the field of physiotherapy, could be a continuation. I hope that ROAM could be of use in clinical physiotherapy and research, with the potential knowledge of movement that is incorporated in it.

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Appendix 8.1 The observation protocol

Place: A small gym or a large room.
Equipment: Video-camera on stall. A CD/MP3-player. A small table and chair.
Props: Paper and pencil. Lego-blocks, beads and pencil- sharpener. A chiffon scarf.

1. Main theme: Body
Sub theme: Activities; locomotion
How to move from one point on the floor to another without using the feet (alone). What body parts are on the floor? Travel across the floor several times finding different alternatives.

2. Main theme: Body
Sub theme: Activities; jumping
How to travel on two feet
a) Find the 5 alternatives
b) Travel with jumps
c) Make a sequence of 8 jumps

3. Main theme: Body
Sub themes: Relationships, body parts, central movements, use of space and effort

a) The child is chosing what hand to work with and the observer is placing her 'mirroring' hand opposite the child's 10 cm apart. The observer is leading the movements with her hand and the child is to follow staying 10 cms apart.
b) Variation in tempo
c) Variation in space
d) The child is leading

4. Main theme: Space
Subthemes: The dimensional cross, central movements and effort
The observer demonstrates the scale, and the child is following through in the different directions. Staying in the door-plane with the hips.
a) Marking the scale with the child's dominant hand
b) The child moves on her/his own
c) Variations in tempo og weight
d) Ta bevegelsen videre til 'vending'
e) Elevasjon og tyngde. Se på strekk og fall.

5. Main theme: Activities
Subthemes: Turning, rising and sinking, central movements
The observer demonstrates turning in the table plane and the child is to work on turning with dominant arm leading. Then change to the other arm leading.

a) Opening and closing
b) Rising and sinking

6. Main theme: Effort
Subthemes: Effort actions
The child is given a chiffon scarf, and the tasks are to move with all the 8 effort actions, starting with those containing firmness and suddenness and ending with gliding and floating.
Afterwards the child will move without the scarf, working with the effort actions containing firmness.

7. Main theme: Effort
Subthemes: Firmness and sustainment, relationships, shadow boxing
Music: Joik
The observer is active as a partner in shadow boxing, moving as slowly and firmly as possible, using the floor and space.

8. Main theme: Body
Subthemes: Dexterity
The child sits at a table.
a) Picking beads and placing them in small holes on the Lego-blocks. With both hands
b) Building anything with the Lego-blocks
c) Sharpening a pencil
d) Drawing a 'pathway' with spirals, zig-zags, lines or geometric figures on a piece of paper.

9. Main theme: Space
Subthemes: Floor patterns, activities
Using the drawing as a map. Travel on the floor according to the shapes on the drawing
a) Make 3 crosses on the map
b) At cross 1. Jump
2. Turn
3. Lie down on the floor
c) Travel through the whole map with the activities.

10. Main theme: Effort
Subthemes: Flow, rhythm
Music: For swing and spring movements
The child is facing the observer and together they are swinging and springing in the rhythm of the music.

11. Main theme: Relationships
Subthemes: Body contact
a) The observer and child are holding hands and pushing against each other
b) Standing back to back. The child is to lean onto the observers back

Appendix 8.2 ROAM Resource Oriented Assessment of Movement

Randi Bentzen

Tic: **A 1. registration** **B 2. registration**	**Date** **Date**	**Code for the informant:** **Sex tic: Girl ( ) Boy ( )**	**Total score**
4 main domains	**25 sub-domains**	**100 separate items**	**Score**
Body	Variety of the use of the body	1. Variety of shapes in the body 2. Variety of the use of body parts 3. Variety of gesture 4. Variety in locomotion	Sum
	Central movements	5. Central mvts when moving in the dimensional cross 6. Central mvts when mirroring with a leader 7. Central mvts when turning/open./closing 8. Central mvts when jumping	Sum
	Activities	9. Ability to jump off the ground 10. Ability to perform the 5 jumps 11. Ability to turn openly 12. Ability to turn closingly	Sum
	Dexterity	13. Drawing with a pencil 14. Picking up beads 15. Grasping a small object 16. Hand dominance	Sum
Effort	Time - Sustained	17. In the upper extremities 18. In the lower extremities 19. In the torso 20. Mvt in the body as a whole	Sum
	Time - Sudden	21. In the upper extremities 22. In the lower extremities 23. In the torso 24. Mvt in the body as a whole	Sum
	Force - Fine touch, light	25 In the upper extremities 26. In the lower extremities 27. In the torso 28. Mvt in the body as a whole	Sum

	Force - Firm	29. In the upper extremities	
		30. In the lower extremities	
		31. In the torso	
		32. Mvt in the body as a whole	Sum
	Direction - Flexible	33. In the upper extremities	
		34. In the lower extremities	
		35. In the torso	
		36. Mvt in the body as a whole	Sum
	Direction - Direct	37. In the upper extremities	
		38. In the lower extremities	
		39. In the torso	
		40. Mvt in the body as a whole	Sum
	Flow - Free	41. In the upper extremities	
		42. In the lower extremities	
		43. In the torso	
		44. Mvt in the body as a whole	Sum
	Flow - Bound	45. In the upper extremities	
		46. In the lower extremities	
		47. In the torso	
		48. Mvt in the body as a whole	Sum
	Thrusting	49. In the upper extremities	
		50. In the lower extremities	
		51. In the torso	
		52. Mvt in the body as a whole	Sum
	Slashing	53. In the upper extremities	
		54. In the lower extremities	
		55. In the torso	
		56. Mvt in the body as a whole	Sum
	Pressing	57. In the upper extremities	
		58. In the lower extremities	
		59. In the torso	
		60. Mvt in the body as a whole	Sum
	Wringing	61. In the upper extremities	
		62. In the lower extremities	
		63. In the torso	
		64. Mvt in the body as a whole	Sum

	Dabbing	65. In the upper extremities 66. In the lower extremities 67. In the torso 68. Mvt in the body as a whole	Sum
	Flicking	69. In the upper extremities 70. In the lower extremities 71. In the torso 72. Mvt in the body as a whole	Sum
	Gliding	73. In the upper extremities 74. In the lower extremities 75. In the torso 76. Mvt in the body as a whole	Sum
	Floating	77. In the upper extremities 78. In the lower extremities 79. In the torso 80. Mvt in the body as a whole	Sum
Space	Dimensional directions (stable)	81. Awareness of up/down 82. Awareness of side/side 83. Awareness of backw/forw 84. Awareness of both sides of the body	Sum
	Floor patterns	85. Make use of the whole paper –sheet 86. Can transfer pattern from paper to floor 87. Can make 3 different shapes on the floor 88. Make use of the whole floor	Sum
	Levels	89. Can elevate to full stretch 90. Can sink to the ground 91. Can move in middle level 92. Awareness of all levels	Sum
Relationship	Eye contact	93. Eye contact when greeting 94. Eye contact when listening 95. Eye contact when working closely with instructor 96. Looking at instructor at a distance	Sum
	Body contact	97. Can touch a partner accidentally 98. Can touch hands with a partner 99. Can push against a partner 100. Can lean on to a partner	Sum

Total score _____

Appendix 8.3

The scale and manual for analysis of the ROAM.

The scale:

-2____ -1.7____-1.3____**-1**____-0.7____-0.3____ **0**____0.3____0.7____ **1**____1.3____1.7____ **2**

The scale goes from 0 = absent to 2 = ideal/maximum. Thus 0.3 is closer to 0 while 0.7 and 1.3 is closer to 1, and 1.7 is in the 2-group.
In very special occasions the findings can be registered on the negative side eg. when force/weight is more a passive heavy-ness than active use of force.

The manual:

1. Variety of shapes in the body

0 = No change of shapes when moving on her/his own
1 = Can change between two different shapes
2 = All 4 shapes are present in her/his movements

2. Variety of the use of body parts

0 = Mainly using hands and arms when moving on her/his own
1 = Some use of legs and feet in addition to hands and arms
2 = Using upper, lower parts, the torso and head

3. Variety of gesture

0 = Gesture is hardly present
1 = Some gesture in both hands and arms
2 = Gesture in arms, legs, the torso and head

4. Variety in locomotion

0 = Only using hands, elbows, knees and feet
1 = Is including the use of torso into crawling, rolling, sliding on stomach and back
2 = Is including hands, knees, torso and locomotion on hands into handstands or cartwheel

5. Central mvts when moving in the dimensional cross
6. Central mvts when mirroring with a leader
7. Central mvts when turning/opening
8. Central mvts when jumping

0 = Peripheral mvts mainly
1 = Some flow of mvt from the center of the body
2 = Flow of mvt from the center of the body to the periphery

9. Ability to jump off the ground

0 = Not able to start or land on both feet
1 = Can start on both feet or land on both feet
2 = Able to start on both feet and land on both feet

10. Ability to perform all 5 jumps

0 = Have difficulties with 1 to 1 on both feet (hinke på begge bein), but manage 1 to the other and 2 to 2.
1 = Can perform 1 to the other, 1 to 1, and 2 to 2
2 = Can perform all 5 jumps on both feet when required

11. Ability to turn openly
12. Ability to turn closingly

0 = Cannot perform the task on either side
1 = Can perform open or closed turning on both sides but without central mvts
2 = Can perform open or closed turning on both sides with central mvts

13. Drawing with a pencil

0 = Is holding the pencil with a power grip
1 = The precision grip in incomplete but with support of the hand
2 = Is holding the pencil with a precision grip and with support of the lateral side of the hand

14. Picking up beads

0 = Cannot pick up the beads
1 = Can pick up beads with a precision/pinch grip but cannot place them in small holes
2 = Can pick up beads with a precision/pinch grip and place them in small holes

15. Grasping a small object

0 = Cannot grasp a small object
1 = Can nearly coordinate the mvts required
2 = Coordinated mvt between opening and closing of fingers and mvt of hand/arm

16. Hand dominance drawing

0 = Is alternating between both hands
1 = Lefthanded
2 = Right hand is dominant

17 – 80.

0 = The mvt is absent or rarely present
1 = The mvt is present but in a medium manner
2 = The mvt is present in a maximum manner

81. Awareness of up/down
82. Awareness of side/side
83. Awareness of backward/forward

0 = Cannot move the body into the directions without changing directional focus
1 = Can move the body mainly into one direction without changing directional focus
2 = Can move the body into opposite directions with one hand leading and with focus

84. Awareness of directions on the non-leading side of the body

0 = The non-leading side of the body is completely passive
1 = The non-leading side of the body is partly active in indicating the direction
2 = The non-leading side of the body is completing the direction in the body

85. When drawing, make use of the whole paper

0 = The drawing is in a small area of the paper and in a very small writing
1 = Make use of half of the paper
2 = Make use of the whole paper

86. Transfer pattern from paper to floor

0 = Does not understand the task
1 = Can transfer most of the pattern from the paper to the floor
2 = Can transfer the pattern on to the floor with at least 3 different directions

87. Make three different shapes with change of directions

0 = Does not understand the task
1 = Can make two shapes with change of directions
2 = Can make three or more shapes on the floor

88. When moving, make use of the whole floor

0 = Moving only in a small area
1 = Make use of most of the floor available
2 = Make use of the whole floor available

89. Elevation

0 = Stretching arm but no elevation of torso or stretch of toes
1 = Flat feet but elevation in torso and arm
1.3 = With stretch of fingers
1.7 = On to toes and stretch of fingers
2 = Can elevate to full stretch on to toes, with stretch of fingers and with focus

90. Sinking to the ground

0 = Cannot sink to the ground
1 = Sinking with some support of feet but mainly reaching down with the leading hand
2 = Sinking with strength and support of gravitational center

91. Can move in medium level

0 = No movements in medium level
1 = Can move in medium level on one side of the body
2 = Can perform movements in two or more directions in medium level

92. Awareness of all levels

0 = Movements are restricted to one level
1 = Move in two levels
2 = Move in all levels

93 - 100. Eye contact and body contact.

0 = Absent. Avoidance
1 = Some reluctance
2 = Present when required

Appendix 8.4 Tables 8 – 31. Internal consistency

The correlation coefficient is Cronbach's Alpha.
The correlation between item and the total score, the correlation between each single item to the sum of the 3 remaining items in the sub-domain, and the inter-item correlation in the sub-domain are presented. (n = 20)

Table 8. Domain: Body. Sub-domain: Variety of the use of the body

Variables	Corrected Item-Total Correlation by Crb. α	Item to sum of sub-dom. by Cronbach α	Inter-Item correlation by Cronbach's α			
			1 Shapes	**2 Bodypa**	**3 Gesture**	**4 Locomot**
1. Shapes	,720	,728	1,000	,777	,750	,055
2. Bodyparts	,825	,840	,777	1,000	,865	,145
3. Gesture	,822	,740	,750	,865	1,000	,001
4. Locomotion	,087	,075	,055	,145	,001	1,000

Table 9. Domain: Body Sub-domain: Central movements

Variables	Corrected Item-Total Correlation by Crb. α	Item to sum of sub-dom. by Cronbach α	Inter-Item correlation by Cronbach's α			
			5. CmDimen	**6. CmLeader**	**7. CmTurn**	**8. CmJump**
5. CmDimens	,587	,613	1,000	,612	,644	,234
6. CmLeader	,599	,732	,612	1,000	,485	,562
7. CmTurning	,677	,551	,644	,483	1,000	,230
8. CmJumping	,215	,364	,234	,562	,230	1,000

Table 10. Domain: Body Sub-domain: Activities

Variables	Corrected Item-Total Correlation by Crb. α	Item to sum of sub-dom. by Cronbach α	Inter-Item correlation by Cronbach's α			
			9. ActJump	**10. Act5Jump**	**11. ActTurnO**	**12. ActTurnCl**
9. ActJump	,000	,000	1,000	,645	,027	,446
10. Act5Jumps	,292	,253	,645	1,000	,046	,365
11. ActTurnO	,244	,454	,027	,046	1,000	,517
12. ActTurnCl	,749	,602	,446	,365	,517	1,000

Table 11. Domain: Body Sub-domain: Dexterity

Variables	Corrected Item-Total Correlation by Crb. α	Item to sum of sub-dom. by Cronbach α	Inter-Item correlation by Cronbach's α			
			13. DexDraw	**14. DexPick**	**15. DexGrasp**	**16. HandDom**
13. DexDraw	,447	,214	1,000	,181	,181	,190
14. DexPick	-,140	,480	,181	1,000	1,000	,299
15. DexGrasp	-,140	,480	,181	1,000	1,000	,299
16. HandDomin	-,315	,350	,190	,299	,299	1,000

Table 12. Domain: Effort Sub-domain: Time - Sustained

Variables	Corrected Item-Total Correlation by Crb. α	Item to sum of sub-dom. by Cronbach α	Inter-Item correlation by Cronbach's α			
			17. TimeSust A	**18. TimeSust B**	**19. TimeSust C**	**20. TimeSust D**
17. TimeSustA	,182	,116	1,000	,035	,122	,154
18. TimeSustB	,260	,792	,035	1,000	,802	,693
19. TimeSustC	,406	,900	,122	,802	1,000	,897
20. TimeSustD	,300	,841	,154	,693	,897	1,000

Table 13. Domain: Effort Sub-domain: Time - Sudden

Variables	Corrected Item-Total Correlation by Crb. A	Item to sum of sub-dom. by Cronbach α	Inter-Item correlation by Cronbach's α			
			21. TimeSud A	**22. TimeSud B**	**23. TimeSud C**	**24. TimeSud D**
21. TimeSuddA	,456	,840	1,000	,944	,785	,714
22. TimeSuddB	,497	,905	,944	1,000	,817	,838
23. TimeSuddC	,641	,921	,785	,817	1,000	,940
24. TimeSuddD	,615	,905	,714	,838	,940	1,000

Table 14. Domain: Effort Sub-domain: Force – Fine touch, light

Variables	Corrected Item-Total Correlation by Crb. α	Item to sum of sub-dom. by Cronbach α	Inter-Item correlation by Cronbach's α			
			25. ForceFine A	**26. ForceFine B**	**27. ForceFine C**	**28. ForceFine D**
25. ForceFineA	,558	,760	1,000	,757	,607	,773
26. ForceFineB	,679	,902	,757	1,000	,834	,694
27. ForceFineC	,706	,795	,607	,834	1,000	,661
28. ForceFineD	,761	,759	,773	,694	,661	1,000

Table 15. Domain: Effort Sub-domain: Force - Firm

Variables	Corrected Item-Total Correlation by Crb. α	Item to sum of sub-dom. by Cronbach α	Inter-Item correlation by Cronbach's α			
			29. F.FirmA	**30. F.FirmB**	**31. F.FirmC**	**32. F.FirmD**
29. ForceFirmA	,664	,762	1,000	,710	,659	,736
30. ForceFirmB	,562	,835	,710	1,000	,691	,845
31. ForceFirmC	,529	,775	,659	,691	1,000	,763
32. ForceFirmD	,725	,873	,736	,845	,763	1,000

Table 16. Domain: Effort Sub-domain: Direction - Flexible

Variables	Corrected Item-Total Correlation by Crb. α	Item to sum of sub-dom. by Cronbach α	Inter-Item correlation by Cronbach's α			
			33. DirFlexA	**34. DirFlexB**	**35. DirFlexC**	**36. DirFlexD**
33. DirFlexA	,622	,719	1,000	,739	,630	,597
34. DirFlexB	,756	,729	,739	1,000	,644	,605
35. DirFlexC	,678	,861	,630	,644	1,000	,973
36. DirFlexD	,626	,823	,597	,605	,973	1,000

Table 17. Domain: Effort Sub-domain: Direction - Direct

Variables	Corrected Item-Total Correlation by Crb. α	Item to sum of sub-dom. by Cronbach α	Inter-Item correlation by Cronbach's α			
			37. DirDirA	**38. DirDirB**	**39. DirDirC**	**40. DirDirD**
37. DirDirectA	,000	,000	1,000	1,000	,315	,315
38. DirDirectB	,000	,000	1,000	1,000	,315	,315
39. DirDirectC	,140	1,000	,315	,315	1,000	1,000
40. DirDirectD	,140	1,000	,315	,315	1,000	1,000

Table 18. Domain: Effort Sub-domain: Flow - Free

Variables	Corrected Item-Total Correlation by Crb. α	Item to sum of sub-dom. by Cronbach α	Inter-Item correlation by Cronbach's α			
			41. FlowFree A	**42. FlowFree B**	**43. FlowFree C**	**44. FlowFree D**
41. FlowFreeA	,676	,945	1,000	,987	,830	,938
42. FlowFreeB	,662	,974	,987	1,000	,880	,952
43. FlowFreeC	,718	,763	,830	,880	1,000	,937
44. FlowFreeD	,734	,976	,938	,952	,937	1,000

Table 19. Domain: Effort Sub-domain: Flow - Bound

Variables	Corrected Item-Total Correlation by Crb. α	Item to sum of sub-dom. by Cronbach α	Inter-Item correlation by Cronbach's α			
			45. FlowBndA	**46. FlowBnd B**	**47. FlowBnd C**	**48. FlowBnd D**
45. FlowBndA	-,146	,985	1,000	,856	1,000	1,000
46. FlowBndB	-,370	,856	,856	1,000	,856	,856
47. FlowBndC	-,150	,983	1,000	,856	,856	1,000
48. FlowBndD	-,150	,983	1,000	,856	1,000	1,000

Table 20. Domain: Effort Sub-domain: Thrusting

Variables	Corrected Item-Total Correlation by Crb. α	Item to sum of sub-dom. by Cronbach α	Inter-Item correlation by Cronbach's α			
			49. Thrust A	**50. Thrust B**	**51. Thrust C**	**52. Thrust D**
49. Thrust A	,595	,562	1,000	,703	,536	,409
50. Thrust B	,591	,755	,703	1,000	,636	,678
51. Thrust C	,590	,866	,536	,636	1,000	,915
52. Thrust D	,568	,819	,409	,678	,915	1,000

Table 21. Domain: Effort Sub-domain: Slashing

Variables	Corrected Item-Total Correlation by Crb. α	Item to sum of sub-dom. by Cronbach α	Inter-Item correlation by Cronbach's α			
			53. Slash A	**54. Slash B**	**55. Slash C**	**56. Slash D**
53. Slash A	,547	,487	1,000	,411	,444	,495
54. Slash B	,752	,699	,411	1,000	,702	,715
55. Slash C	,742	,814	,444	,702	1,000	,902
56. Slash D	,675	,837	,495	,715	,902	1,000

Table 22. Domain: Effort Sub-domain: Pressing

Variables	Corrected Item-Total Correlation by Crb. α	Item to sum of sub-dom. by Cronbach α	Inter-Item correlation by Cronbach's α			
			57. Press A	**58. Press B**	**59. Press C**	**60. Press D**
57. Press A	,490	,592	1,000	,532	,740	,164
58. Press B	,580	,681	,532	1,000	,693	,394
59. Press C	,678	,799	,740	,693	1,000	,434
60. Press D	,317	,410	,164	,394	,434	1,000

Table 23. Domain: Effort Sub-domain: Wringing

Variables	Corrected Item-Total Correlation by Crb. α	Item to sum of sub-dom. by Cronbach α	Inter-Item correlation by Cronbach's α			
			61. Wring A	**62. Wring B**	**63. Wring C**	**64. Wring D**
61. Wring A	,097	,104	1,000	-,307	-,207	,102
62. Wring B	-,165	,795	-,307	1,000	,782	,807
63. Wring C	,166	,610	-,207	,782	1,000	,618
64. Wring D	,013	,747	,102	,807	,618	1,000

Table 24. Domain: Effort Sub-domain: Dabbing

Variables	Corrected Item-Total Correlation by Crb. α	Item to sum of sub-dom. by Cronbach α	Inter-Item correlation by Cronbach's α			
			65. Dab A	**66. Dab B**	**67. Dab C**	**68. Dab D**
65. Dab A	,505	,575	1,000	,598	,412	,484
66. Dab B	,518	,587	,598	1,000	,507	,454
67. Dab C	,542	,771	,412	,507	1,000	,927
68. Dab D	,562	,772	,484	,454	,927	1,000

Table 25. Domain: Effort Sub-domain: Flicking

Variables	Corrected Item-Total Correlation by Crb. α	Item to sum of sub-dom. by Cronbach α	Inter-Item correlation by Cronbach's α			
			69. Flick A	**70. Flick B**	**71. Flick C**	**72 Flick D**
69. Flick A	,451	,638	1,000	,810	,404	,240
70. Flick B	,600	,822	,810	1,000	,539	,510
71. Flick C	,607	,645	,404	,539	1,000	,855
72. Flick D	,447	,559	,240	,510	,855	1,000

Table 26. Domain: Effort Sub-domain: Gliding

Variables	Corrected Item-Total Correlation by Crb. α	Item to sum of sub-dom. by Cronbach α	Inter-Item correlation by Cronbach's α			
			73. Glide A	**74. Glide B**	**75. Glide C**	**76. Glide D**
73. Glide A	,365	,694	1,000	,612	,602	,755
74. Glide B	,410	,810	,612	1,000	,783	,753
75. Glide C	,487	,822	,602	,783	1,000	,789
76. Glide D	,580	,857	,755	,753	,789	1,000

Table 27. Domain: Effort Sub-domain: Floating

Variables	Corrected Item-Total Correlation by Crb. α	Item to sum of sub-dom. by Cronbach α	Inter-Item correlation by Cronbach's α			
			77. Float A	**78. Float B**	**79. Float C**	**80. Float D**
77. Float A	,368	,646	1,000	,629	,648	,630
78. Float B	,607	,891	,629	1,000	,982	,908
79. Float C	,587	,920	,648	,982	1,000	,961
80. Float D	,577	,881	,630	,908	,961	1,000

Table 28. Domain: Space Sub-domain: Dimensional directions

Variables	Corrected Item-Total Correlation by Crb. α	Item to sum of sub-dom. by Cronbach α	Inter-Item correlation by Cronbach's α			
			81. UpDown	**82. SideSide**	**83. BackForw**	**84. BothSides**
81. UpDown	,538	,583	1,000	,818	,610	,174
82. SideSide	,463	,696	,818	1,000	,575	,334
83. BackForw	,599	,682	,610	,575	1,000	,449
84. BothSides	,187	,360	,174	,334	,449	1,000

Table 29. Domain: Space Sub-domain: FloorPatterns

Variables	Corrected Item-Total Correlation by Crb. α	Item - sum of sub-dom. by Cronbach α	Inter-Item correlation by Cronbach's α			
			85. Papersheet	**86. Transfer**	**87. 3Shapes**	**88. UseFloor**
85. Papersheet	,295	,344	1,000	,223	,207	,384
86. Transfer	,481	,702	,223	1,000	,560	,703
87. 3Shapes	-,132	,363	,207	,560	1,000	,099
88. UseFloor	,620	,567	,384	,703	,099	1,000

Table 30. Domain: Space Sub-domain: Levels

Variables	Corrected Item-Total Correlation by Cronb. α	Item - sum of sub-dom. by Cronbach α	Inter-Item correlation by Cronbach's α			
			89. FullStretch	**90. Sink**	**91. Middle**	**92. AllLevels**
89. FullStretch	,544	,393	1,000	,398	,279	,279
90. Sink	,320	,650	,398	1,000	,646	,646
91. Middle	,441	,706	,279	,646	1,000	1,000
92. AllLevels	,441	,706	,279	,646	1,000	1,000

Table 31. Domain: Relationship Sub-domain: Eye Contact

Variables	Corrected Item-Total Correlation by Crb. α	Item - sum of sub-dom. by Cronbach α	Inter-Item correlation by Cronbach's α			
			93 EyeCntact	**94. EyeCntact**	**95. EyeCntact**	**96. EyeCntact**
93, 94, 95, 96 EyeContact	1,000	1,000	1,000	1,000	1,000	1,000

For the sub-domain Body Contact (variables 97-100) there are no results as the values were zero and there were no correlations obtained.

Appendix 8.5

Biography and legacy of Rudolf Laban

Rezso Keresztelo Szent Janos Attila (Rudolf) Laban was born in Bratislava in the then Austro-Hungarian Empire in 1879 as son of a high ranking military figure. As a young boy he spent much of his time with peasants, dockers, visiting circus-artists and gypsies as well as the court circles of Vienna. At the age of 14 years he joined the town's theatre after school hours, and became aquainted with opera, ballet and theatre. At the age of 20 he enrolled at the Military Academy of Wiener Neustadt, training in sports like riding and fencing in addition to dance, and social and military etiquette. He broke off his studies, moved to Paris and enrolled at the Ecoles des Beaux Arts to study architecture. He became increasingly occupied by observing and analysing movements and behaviour, and his major focus was the search for natural movements in work and artistic dancing. He moved to Munich in 1909. He revolutionised the *Bewgungskunst* and in 1919 he was running dance companies and opening a dance school for professionals and amateurs. He published articles and books and created performances. By 1929 he had started 25 Laban schools and was recognised in Europe as an intellectual both within the field of dance theatre but also as the leader of the *Ausdrucktanz* movement. He became one of Europe's most famous choreographers.

From 1930 to 1934 he was director of the Allied State Theatres in Berlin after which he was promoted director of the Deutsche Tanzbuhne, and directed major dance festivals under the funding of Joseph Goebbels. He fell out with the Nazi regime in 1936 when Goebbels banned his opening ceremony of the Olympics in Berlin, after the dress rehearsal. He was not furthering the Nazi agenda.

He fled from Germany and arrived in England at Dartington Hall in Devon in 1938. Here he was reunited with other refugees from Germany like Lisa Ullmann, and joined the Jooss-Leeder Dance School. In the years to come he created many political anti-war ballets and anti-poverty ballets together with his pupil Kurt Jooss.

Lisa Ullmann had been his close associate since pre-war days and had already established a movement choir in Plymouth for the Worker's Educational Association. Because of un-certainties of the wartime, Laban and Ullmann moved to London where they started movement courses for teachers. This was the beginning of 'Modern Dance Holiday Courses' which were held until 1961. In 1942 the title of 'Modern Dance' was changed to 'Modern Educational Dance' (MED).

In 1946 Lisa Ullmann opened her Art of Movement Studio in Manchester which became the centre for educational dance in England. Laban published his book "Modern Educational Dance" in 1948 which was widely read. Dance in education increased to its height in the beginning of the 1960's. In 1964 most of the 26 colleges of physical education (P.E.) in England offered MED education to teachers, and it was taught in schools to children at all ages well into the 70's all over Britain. It was part of community dance to men and women also all over the country. In 1962 American Modern Dance was introduced to colleges of P.E. which gradually led to the decline of MED.

Early, at the beginning of the century, Laban started to develop notation systems to record movements and dances. One system, known as Kinetography Laban, was published in his book "Kinetography" in 1928. In England, the International Council of Kinetography Laban

was founded in 1959 with members appointed by Laban: Lisa Ullmann, Albrecht Knust, Sigurd Leeder and Ann Hutchinson. The latter founded the Dance Notation Bureau Inc. in New York in 1940 and published the book "Labanotation" in 1954. The bureau has been an educational institution with the aims of *furthering the art of dance through the use of a system of notation* (Hutchinson,1974). Within education a system of Motif Writing has been developed by Valerie Preston-Dunlop.

The industry in England took interest in Laban's observations during World War 2nd, when women invaded the factories and conveyor belts. The effectivity, rhythm and loads had to be analysed. FC Lawrence who was a consultant in movement observations, started a cooperation with Laban in the observations of manual work. This became the ground for the development of the Effort-analysis (Laban and Lawrence, 1974). Shortage of films made it necessary to notate and describe, and to be able to notate the qualities of movement, an Effort graph was developed. Laban and Lawrence continued the studies to include observations of office-workers and managers in the factories (Moore, 2005). Studies in this field have been further carried out by Lamb (1965), who was also working closely with Lawrence and Laban. He developed the Movement Pattern Analysis during the 1940's and 50's which is today employed in larger firms and companies to test the personal decision-making profiles of managers, board-members and employees (Moore et al, 1988). In 1993 The Motus Humanus was founded in Denver, Colorado, US, which is a professional organization to furthering the study of movement in Laban's tradition in the US.

Laban travelled all over the world, and in the U.S he started the study of 'The Core concept' in New York with dancer and physiotherapist Irmgard Bartenieff who later developed her pedagogy and exercise-battery called Bartenieff Fundamentals (Bartenieff et al, 1980). In 1978, she was the founder of the Laban/Bartenieff Institute of Movement Studies LIMS in New York. This institute offers studies in the Laban and Bartenieff movements and offers the title of Certified Movement Analyst (CMA) through graduate level Certification Programs. The LIMS has today a professional dance company touring internationally.

In 1946 the Laban Art of Movement Guild was formed.

In 1953 Laban moved with Lisa Ullmann to Addlestone, Surrey, to establish the Art of Movement Studio. He was lecturing there until his death in 1958.

Lisa Ullmann continued as director of 'the Studio' and continued to teach occasionally after her retirement in 1973. She had started The Laban International Summer Courses (LinC) and continued as Artistic Director until her death in 1985. Sam and Susi Thornton became the directors of LinC in 1978 and have continued until today.

Marion North became Principal and Director of 'the Studio' in 1973. In 1975 'the Studio' was renamed Laban Centre for Movement and Dance and moved to New Cross in South East London. Today it is part of The Trinity LABAN Conservatoire of Music and Dance. A well-renowned building at Creekside, South East London, is now the magnificent dancing site for 'LABAN' and its professional dance company, The Transitions Dance Company.

Laban archives

The Rudolf Laban Archive was donated by Lisa Ullmann, in addition to her own archive, to the National Resource Centre for Dance (NRCD) at the University of Surrey in England. This archive also includes donations from many of Laban's colleagues and pupils. At LABAN there are material collected by Valerie Preston-Dunlop and other associates. The Dance Notation Bureau, New York is the holder of a catalogue of scores in Labanotation. There also exist Laban archives in European cities.

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www.laban.org

Appendix 8.6 Letter of information and form of consent I

Appendix to the application to the Regional Committee for Medical Research Ethics Western Norway.

Førespurnad om å delta i ei undersøking av rørsler hos barn.

Her kjem ei førespurnad til barna i klasse 7A om å delta i ein mastergradsstudie utført av fysioterapeut Randi Bentzen våren 2007, som ledd i hennar mastergradsoppgåve i fysioterapivitskap ved Universitetet i Bergen.

Fysioterapeutar har ei rekkje metodar for å undersøkja rørslene til barn. I dei fleste metodane blir *vanskane* med å utføra einskilde oppgåver observert. Randi held på å utvikla ein metode for å finna kva for *ressursar* barn har i rørslene sine. Som mastergradsoppgave ønskjer ho å prøva den på vanlege barn.
Ho ønskjer å gjera video-opptak av barna. Etterpå skal ho analysera rørslene frå video, to gonger, for å finna ut om ho kan analysera likt. Dette er kalt å vurdera intra-tester reliabilitet og er naudsynt for å kunna nytta metoden vidare.
Som ein gjenyting til elevane kan Randi tenkja seg å undervisa i dans i klassane som deltek.

Praktisk.
Randi vil vere saman med eit barn om gongen i gymsalen på 'Folkehøgskulen' i ca. 45 minuttar. Barna vil få oppgåver som dei skal utføra fysisk, på sitt eige vis. Det er ingen fasit på oppgåvene så dei skal ikkje prestera eller vera 'flinke'. Det er litt annleis enn vanleg gymnastikk, men Randi har lang erfaring med å undervisa barn og ungdomar og veit at dei likar denne typen oppgåver. Det vil bli gjort video-opptak med ein annan vaksen person bak kamera. Tidspunkt vil bli avtalt med foreldra.

Klede.
Ledig tøy/treningstøy og barbeint.

Deltakarar i undersøkinga.
Til undersøkinga treng ho 20 elevar i 7. klasse.
Deltakinga er frivillig. Dei som melder seg på kan når som helst trekkja seg frå studien utan å oppgi grunn.

Anonymitet.
Eleven vil bli gitt ein kode, og navnet til eleven vil aldri bli opplyst i datamaterialet eller i oppgåva.

Lagring av video:
Videoen vert framstilt i 1 kopi som vert lagra i låst arkivskap og kun er tilgjengeleg for Randi Bentzen og rettleiarar i prosjektperioden. Videoen vert sletta etter at analysen er ferdig, hausten 2007.

Dei som har lyst å delta.
Vedlagt følgjer ei samtykkje-erklæring som ein av foreldra og eleven må underteikna. Denne tek eleven med seg tilbake til klasselærar Maj-Brit Bjørke.

Med venleg helsing

Randi Ese Ur Rektor ved Sand skule	Randi Bentzen Fysioterapeut/Mastergradsstudent Mobil: 950 81 947 Adr: Prestaåsen 66, 4230 Sand

Erklæring til samtykkje.

Eg/vi har motteke skriftleg informasjon om undersøkinga til Randi Bentzen som inneber å delta i ein time der ho vil observera og seinare analysera rørslene til barn ved Sand skule. Undersøkinga er del av ein Mastergradsoppgåve ved Universitetet i Bergen. Den har tittel:

"Aspekter ved utvikling av 'Ressursorientert bevegelsesanalyse RBA-100'. En metode til observasjon og analyse av barns bevegelsesmønster."

Eg har lest informasjonsskrivet og har lyst til å delta i undersøkinga. Eg veit eg kan trekkja meg undervegs eller be om at videoen vert sletta, når som helst etterpå, dersom eg ønskjer det.

……..
Stad og dato

…….
Eleven sin underskrift

Eg/vi har lest denne informasjonen og samtykkjer i at vår sønn/datter kan delta i undersøkinga. Vi er innforstått med at deltaking er frivillig og at vi når som helst kan trekkja deltakinga tilbake og få videoen sletta. All informasjon vil vera anonym.

……
Stad og dato

……
Underskrift til ein av foreldra

……
Telefon/mobil nummer

Svar returnerast i vedlagde svarkonvolutt til
Klasselærar Maj-Brit Bjørke
Sand Skule

Appendix 8.7 Acceptance by the Regional Committee for Medical Research Ethics, Western Norway

UNIVERSITETET I BERGEN
Regional komité for medisinsk forskningsetikk, Vest-Norge (REK Vest)

Førsteamanuensis Synnøve Iversen
Nasjonalt senter for leseopplæring
og leseforskning,
Universitetet i Stavanger,
4036 Stavanger

Deres ref	Vår ref	Dato
	07/6410-101.07/ars	01.06.2007

Ad. prosjekt: Aspekter ved utvikling av Ressursorientert Bevegelsesanalyse RBA-100. En metode til observasjon og analyse av barns bevegelsesmønster (101.07)

Det vises til din søknad om etisk vurdering datert 11.04.07. REK Vest vurderte studien i møte den 24.05.07.

Forskning som foregår i en institusjonssammenheng som skole, kan etisk sett være særlig utfordrende. En tenker da på hvordan organisere slik forskning og samtidig ivareta frivilligheten ved deltakelse. Komiteen ser det som ønskelig at slik forskning i mest mulig grad er organisert slik at forskningsprosjektet og skolens øvrige aktiviteter er skilt og at skolens personale ikke involveres i selve forskningen. Alt praktisk arbeid med prosjektet bør gjøres av prosjektmedarbeiderne selv.
Komiteen mener også at en bør ha en beredskap dersom uventede hendelser dukker opp.
En bør også legge opp til at begge foreldre skriver under på samtykkeerklæringen.
Informasjonsskrivet bør strammes opp. Med utgangspunkt i hva vi har skrevet i første avsnitt, bør ikke rektor stå som underskriver på informasjonsskrivet for studien, selv om hun har gitt tillatelse til at studien gjennomføres der. Det kan eventuelt vedlegges et skriv fra rektor, på skolens brevark, der det går frem at skolen har gitt den aktuelle tillatelse.
Men dette skrivet bør være nøytralt og en bør på ingen måte oppfordre elvene til å delta, da det bryter med etiske prinsipper for ivaretaking av frivillighet hvis en autoritetsperson, som rektor, ber sine elever om å delta i forskning. Skrivet er ellers lagt opp svært personlig der det gjentatte ganger vises til denne "Randi" og hva hun skal gjøre osv. En bør en bruke en mer upersonlig form. Opplysningene om frivillighet bør gis i eget avsnitt med overskrift "Frivillighet"
Skrivet bør også organiseres noe annerledes. Skrivet skal ha to deler, en informasjonsdel og en samtykkeerklæring. Mens informasjonsskrivet skal gi all nødvendig informasjon om studien, skal samtykkeerklæringen være helt kort: Overskrift skal være "Samtykkeerklæring", studiens tittel bør fremgå, og innholdet bør begrense seg til å si at "Eg har motteke informasjon om undersøkjinga og seier meg viljug til å delta." For foreldra bør det stå omtrent slik: "Eg/vi har motteke informasjon om undersøkjinga og samtykkjer til at vår son/dotter kan vera med."
REK Vest forutsetter at merknadene tas til følge og studien er da endelig klarert fra denne komité sin side.

Postadresse
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5020 Bergen

rek-vest@uib.no
www.etikkom.no/REK
Org no. 874 789 542

Regional komité for medisinsk
forskningsetikk, Vest-Norge
Telefon 55 97 84 97 / 98 / 99

Besøksadresse
Haukeland
Universitetssykehus

Vi ønsker dere lykke til med gjennomføringen og minner om at komiteen setter pris på en sluttrapport, eventuelt en kopi av trykt publikasjon når dette foreligger.

Med vennlig hilsen

Jon Lekven
leder

Arne Salbu
sekretær

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Haukeland
Universitetssykehus

Appendix 8.8 Revised letter of information and form of consent II

Førespurnad om å delta i ei undersøking av rørsler hos barn.

Underteikna er fysioterapeut og mastergradsstudent i fysioterapivitskap ved Universitetet i Bergen. Her kjem ei førespurnad til barna i klasse 7A (6A) om å delta i ei undersøking som ledd i ei mastergradsoppgåve. Den har tittelen:
"Aspekter ved utvikling av 'Ressursorientert bevegelsesanalyse RBA-100'. En metode til observasjon og analyse av barns bevegelsesmønster."

Fysioterapeutar har ei rekkje metodar for å undersøkja rørslene til barn. I dei fleste metodane blir *vanskane* med å utføra einskilde oppgåver observert. Denne undersøkinga skal kartleggja kva for *ressursar* barn har i rørslene sine. Det vil vera 20 barn i undersøkinga.

Det vil bli gjort video-opptak av barna. Etterpå skal rørslene bli analysert frå video, to gonger, og desse resultata vil bli samanlikna. Dette er kalt å vurdera intra-tester reliabilitet og er naudsynt for å kunna utvikla metoden vidare.
Som ei gjenyting til elevane vil dei få undervisning i dans til hausten.

Praktisk.
Fysioterapeuten vil vere saman med eit barn om gongen i gymsalen på 'Folkehøgskulen' i ca. 45 minuttar. Barna vil få oppgåver som dei skal utføra fysisk, på sitt eige vis. Det er ingen fasit på oppgåvene så dei skal ikkje prestera eller vera 'flinke'. Det vil bli gjort video-opptak med ein annan vaksen person bak kamera. Tidspunkt vil bli avtalt med foreldra.

Klede.
Ledig tøy/treningstøy og barbeint.

Frivilligheit.
Deltakinga er frivillig. Dei som melder seg på kan når som helst trekkja seg frå studien utan å oppgi grunn.

Anonymitet.
Eleven vil bli gitt ein kode, og navnet til eleven vil aldri bli opplyst i datamaterialet eller i oppgåva.

Lagring av video:
Videoen vert framstilt i 1 kopi som vert lagra i låst arkivskap og kun er tilgjengeleg for prosjektmedarbeidar og rettleiarar i prosjektperioden. Videoen vert sletta etter at analysen er ferdig, hausten 2007.

Dei som vil delta.
Vedlagt følgjer ei samtykkje-erklæring som foreldra og eleven må underteikna. Denne tek eleven med seg tilbake til klasselærar.

Med venleg helsing

_____

Randi Bentzen
Fysioterapeut/Mastergradsstudent
Mobil: 950 81 947 Adr: Prestaåsen 66, 4230 Sand E-post: rabentz@online.no

Erklæring til samtykkje.

Eg har motteke informasjon om undersøkinga av rørsler hos barn og seier meg viljug til å delta:

…….
Stad og dato

…….
Eleven sin underskrift

Eg/vi har motteke informasjon om undersøkinga og samtykkjer i at vår son/dotter kan vera med.

……
Stad og dato

……	……
Underskrift til foreldra	Underskrift til foreldra
.....	……
Telefon/mobil nummer	Telefon/mobil nummer
……	……
E-post adresse	E-post adresse

Svar returnerast i vedlagde svarkonvolutt til
Klasselærar
Sand Skule